



Colorado Department
of Public Health
and Environment



Final Rocky Flats Cleanup Agreement

July 19, 1996

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CONTROLLED DOCUMENT
(If numbered in red ink-block numbering
indicates information only copy.)

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Copy Number

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FINAL ROCKY FLATS CLEANUP AGREEMENT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
and
THE STATE OF COLORADO

IN THE MATTER OF:

FEDERAL FACILITY
AGREEMENT AND
CONSENT ORDER

UNITED STATES DEPARTMENT
OF ENERGY
ROCKY FLATS ENVIRONMENTAL
TECHNOLOGY SITE

CERCLA VIII-96-21
RCRA(3008(h)) VIII-96-01
STATE OF COLORADO
DOCKET # 96-07-19-01

PREAMBLE TO THE ROCKY FLATS CLEANUP AGREEMENT

A. INTRODUCTION

Activities at Rocky Flats will be guided generally by the Rocky Flats Vision (See Appendix 9). The Rocky Flats Cleanup Agreement is the legally binding agreement between the Department of Energy (DOE), the Environmental Protection Agency (EPA), and the Colorado Department of Public Health and Environment (CDPHE) to accomplish the required cleanup of radioactive and other hazardous substances contamination at and from the Rocky Flats Environmental Technology Site (RFETS). The U.S. Government owns RFETS and DOE is the Party required by law to perform the cleanup work. DOE's activities in this regard are subject to the EPA's and CDPHE's statutory authorities to approve and monitor both the conduct and the completion of the cleanup.

The following objectives will help to guide implementation of the Rocky Flats Cleanup Agreement (RFCA) in order to achieve the goals expressed in the Vision. The provisions of the RFCA, which follow, comprise the legal document that describes the relationship between the Agencies during cleanup. The RFCA will also ensure the effective and efficient cleanup of the Site. The following objectives, while not legally binding commitments unless also included within the body of RFCA (or other binding documents, orders or regulatory requirements), define how DOE and the regulators will oversee specific activities at the Site, and will guide implementation of RFCA to be consistent with, and to help achieve goals of the Rocky Flats Vision.

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B. OBJECTIVES

Each objective includes a broad Summary, followed by more specific statements for each topic in the Near-Term and Intermediate Site Conditions.

1. Disposition of Weapons Useable Fissile Materials and Transuranic Wastes

Summary: DOE will stabilize, consolidate, and temporarily store weapons useable fissile materials and transuranic wastes on-site for removal; ultimate removal of weapons useable fissile material is targeted for no later than 2015.

- a. Near-Term Site Condition. DOE will stabilize, consolidate, and store weapons useable fissile materials and transuranic wastes on-site in a safe and cost-effective manner. Weapons useable fissile material is targeted for removal from RFETS as soon as possible, beginning no later than 2010 and to be completed by 2015. No additional weapons useable fissile material will be transferred onto RFETS.

Other special nuclear material that is not weapons useable fissile materials or transuranic waste will be shipped off-site as soon as possible.

Transuranic waste will be shipped to the Waste Isolation Pilot Plant (WIPP) as soon as this facility is available to accept waste from RFETS. DOE, EPA and the State of Colorado are committed to aggressively pursuing the early opening of WIPP and making it available to accept wastes from RFETS as soon as possible. If WIPP is not opened, does not have sufficient capacity to accept all of RFETS's transuranic waste, or is otherwise not available, another off-site facility will be identified, and TRU waste will be shipped to the alternate facility as soon as possible.

- b. Intermediate Site Condition. Weapons useable fissile materials are targeted for removal from RFETS by 2015. By the end of the Intermediate Site Condition, all transuranic waste will have been removed from RFETS.

2. On-Site and Off-Site Waste Management

There are substantial risks and costs in removing wastes now stored on-site and those wastes that will be generated during plutonium stabilization, cleanup and building decommissioning. DOE, together with the regulators and with appropriate public participation, will determine which wastes are stored or disposed on-site or removed through an ongoing process consistent with this Objective.

Summary: Waste management activities for low-level, low-level mixed, hazardous, and solid wastes will include a combination of on-site treatment, storage in a retrievable and monitored manner, disposal, and off-site removal. Low-level and low-level mixed wastes generated during cleanup will be stored in a safe, monitored and retrievable manner for near-term shipment off-site, long-term storage with subsequent shipment off-site and/or long-term storage with subsequent disposal on-site of the remaining wastes.

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- 1 a. Near-Term Site Condition. Initially, controlling the sources of contamination will take
2 priority over off-site waste shipments to maximize risk reduction. Off-site shipments of
3 waste will occur based on consideration of relevant factors, including risk, technology,
4 facility availability, and cost. DOE, EPA and CDPHE will actively seek off-site facilities
5 to accept RFETS's waste.
6

7 During this period, most active environmental cleanup will be completed. Cleanup will
8 include the treatment, consolidation, and management of contaminated soil, water and
9 material. Low-level and low-level mixed wastes generated during cleanup will be stored
10 in a safe, monitored and retrievable manner for near-term shipment off-site, long-term
11 storage with subsequent shipment off-site, and/or long-term storage with subsequent
12 disposal on-site of the remaining wastes. For both storage options, the wastes will be
13 stored in a manner that is environmentally safe, and in compliance with legal
14 requirements. Decisions about the manner of providing retrievability and monitorability
15 will be based on the following factors: risk, legal requirements, waste type, technology,
16 cost effectiveness, and community concerns. For any stored waste that remains on-site
17 (other than those stored temporarily awaiting shipment off-site), storage facilities will be
18 designed to provide safe storage with an option to convert to disposal at some time in the
19 future. Decisions about whether to utilize treatment, storage or disposal options, or to
20 convert from storage to disposal, will be made during this period, always with an
21 opportunity for public input.
22

23 Existing and any future on-site landfills will be closed in compliance with legal
24 requirements. The landfills will be capped using a low-profile contour, designed to blend
25 in with the natural topography of the Site.
26

- 27 b. Intermediate Site Condition. Waste materials that are to be removed will have been
28 shipped off-site. Any necessary follow-up cleanup related to the former storage sites will
29 have been completed. By the end of this period, decisions will have been made regarding
30 stored material for its continued storage, treatment or disposal.
31

32 3. Water Quality

33
34 **Summary:** At the completion of cleanup activities, all surface water on-site and all
35 surface and groundwater leaving RFETS will be of acceptable quality for
36 all uses.
37

- 38 a. Near-Term Site Condition. The Agencies are committed to reliable controls and
39 monitoring to protect water quality during cleanup activities, storage of special nuclear
40 material and wastes, and storm events. Contaminants and contamination sources that pose
41 an unacceptable risk will be removed, controlled, or stabilized. Protection of all surface
42 water uses will be a basis for making interim soil and groundwater cleanup and
43 management decisions. Actions will be designed to prevent adverse impacts to ecological
44 resources and groundwater consistent with the Action Levels and Standards Framework
45 Attachment to the RFCA.

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Surface water leaving RFETS will continue to be diverted around Standley Lake and the Great Western Reservoir. The quality of surface water leaving RFETS during cleanup activities will meet standards for aquatic life, recreation, and agricultural classifications, but not for domestic (drinking water) use. On-site groundwater will not be used for any purpose unrelated to RFETS cleanup activities. Surface water standards for plutonium and americium during cleanup activities will be based on a conservative risk-based approach. Proposed changes to state water quality standards will be presented to the Colorado Water Quality Control Commission for approval.

Water quality management plans will be developed with the participation and involvement of municipalities and counties whose water supplies are potentially affected by RFETS.

- b. Intermediate Site Condition. By the time cleanup activities are completed, all on-site surface water and all surface water and groundwater leaving RFETS will be of acceptable quality for all uses including domestic water supply. Groundwater quality in the Outer Buffer Zone and off-site will support all uses. On-site groundwater will not be used for any purpose unrelated to RFETS cleanup activities. Reliable monitoring and controls to protect water quality during storage of plutonium and other special nuclear material and wastes, and during storm events, will continue. To assure the above described water quality, long-term operation and maintenance of waste management and cleanup facilities will continue.

4. Cleanup Guidelines

Summary: Cleanup activities will be conducted in a manner that will:

- ** reduce risk;
- ** be cost-effective;
- ** protect public health;
- ** protect reasonably foreseeable land and water uses;
- ** prevent adverse impacts to ecological resources, surface water and groundwater; and
- ** be consistent with a streamlined regulatory approach.

- a. Near-Term Site Condition. Cleanup will include treatment, consolidation, and management of contaminated soil, water and materials in a manner that protects public health, reduces the impact to the natural environment, and minimizes the generation of new wastes. Environmental cleanup will be accomplished to protect and support open space uses in the Inner and Outer Buffer Zones and limited industrial uses as noted in the Future Site Use Working Group (FSUWG) report ¹. In the vicinity of buildings converted to non-DOE use, cleanup will be to industrial use levels in the Industrial Area. See also the discussion in the Land Use section below.

¹ The FSUWG's June 1995 Report, "Future Site Use Recommendations," is available in the repositories listed in Attachment 7.

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- b. Intermediate Site Condition. After off-site disposition of plutonium, other special nuclear material and transuranic wastes, the cleanup of the buildings that contained these materials, and of any residual waste from their shipment or storage, will be completed. Appropriate monitoring, operation and maintenance of any remaining treatment, storage, or disposal facilities will continue.

5. Land Use

Summary: Cleanup decisions and activities are based on open space and limited industrial uses; the particular land use recommendations of the Future Site Use Working Group (FSUWG) are not precluded; specific future land uses and post-cleanup designations will be developed in consultation with local elected officials, local government managers, RFLII, CAB, other groups and citizens. The Parties recognize the legal authority of local government to regulate future land use at and near RFETS.

- a. Near-Term Site Condition. The Buffer Zone will be managed, and cleaned as necessary, to accommodate open space uses in the Buffer Zone and open space or industrial uses in the existing Industrial Area. During this period, access to the Buffer Zone will remain controlled consistent with cleanup efforts and the need for a safety and security zone around weapons useable fissile material on-site. A part of the Industrial Area will be reserved for waste treatment, storage, or disposal facilities.

During cleanup, non-DOE activities may take place in areas other than the Buffer Zone, provided they do not adversely impact cleanup and closure work. Particular open space and industrial uses as recommended by the FSUWG are not precluded. These uses will be developed in consultation with local elected officials, local government managers, RFLII, CAB, other groups and citizens. See the FSUWG Report for additional detail regarding recommended land uses during and after cleanup.

- b. Intermediate Site Condition. At the beginning of this period, access to the Buffer Zone will continue to be controlled consistent with the safety and security needs of plutonium, other special nuclear material and transuranic wastes. After weapons useable fissile material and transuranic wastes are removed, DOE will work with local elected officials, local government managers, RFLII, CAB, other groups and citizens to determine the optimal use of the Buffer Zone. Any access controls and/or institutional controls that are necessary or appropriate for public health, environmental protection, ongoing monitoring and operation and maintenance activities, will continue.

6. Environmental Monitoring

Summary: Environmental monitoring will be maintained for as long as necessary.

- a. Near-Term Site Condition. A robust environmental monitoring system will be maintained to provide information for cleaning up the Site, to assure public safety, and to keep the public informed. The system will maximize the available resources of the Agencies and

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municipalities and will minimize duplicative efforts. The system will include both routine (baseline and regular) and non-routine (to respond to events or worst case) monitoring.

- b. Intermediate Site Condition. After plutonium, other special nuclear material and transuranic wastes are gone, the monitoring system will continue to address remaining waste management facilities and water quality needs. This monitoring system will remain in place for as long as necessary for the protection of public health, environment, and safety.

7. Building Disposition

Summary: All contaminated buildings will be decontaminated as required for future use or demolition; unneeded buildings will be demolished.

- a. Near-Term Site Condition. All contaminated buildings will be decontaminated as required for future use or demolition. Building demolition or reuse will take place after plutonium, other special nuclear material, transuranic waste, and radioactive hot-spots have been removed. In most cases, contaminated systems (such as gloveboxes, duct-work and piping) will be decontaminated and removed prior to demolition. In a few instances, contaminated systems will be decontaminated and demolished along with the building.

Radioactive material removed from buildings will be either processed and added to RFETS's plutonium inventory, packaged as transuranic waste for eventual removal, or handled as low-level or low-level mixed waste and stored in a retrievable and monitored manner. Uncontaminated or decontaminated buildings will be demolished or made available to the private sector for other economic uses in consultation with local officials, the Community Reuse Organization, and interested members of the public, provided that these uses do not adversely impact cleanup and closure activities. Building debris will be disposed of as follows: clean rubble will be recycled, stored or removed, or disposed on-site; contaminated rubble will be stored on-site in a retrievable and monitored manner or disposed.

- b. Intermediate Site Condition. By the end of this period, the remaining buildings that were used for plutonium, other special nuclear material, and transuranic waste storage will have been demolished. Also by the end of this period, decisions will have been made regarding material that has been stored in a retrievable and monitored manner for its continued treatment, storage or disposal.

8. Mortgage Reduction

Summary: Weapons useable fissile material and transuranic wastes will be safely consolidated into the smallest number of buildings to reduce operating costs and shrink the security perimeter; contaminated and non-contaminated buildings will be decommissioned and either demolished or turned over for other non-DOE uses.

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- 1 a. Near-Term Site Condition. DOE will stabilize and consolidate weapons useable fissile
2 material and transuranic wastes to achieve safer and less expensive storage while awaiting
3 removal of these materials. The contaminated buildings from which these materials were
4 removed will be decontaminated and closed. RFETS will also close or convert to
5 non-DOE uses non-contaminated buildings by the end of this period. In consultation with
6 local officials, the Community Reuse Organization, and interested members of the public,
7 utilities and other infrastructure will be substantially reduced during this period. As
8 operating costs are reduced through building shut-downs, every effort will be made to
9 return the cost savings to RFETS to fund cleanup and closure activities.
- 10
- 11 b. Intermediate Site Condition. During this period, the secured area will be further reduced
12 and eventually removed. Operating costs will be minimized. By the end of this period,
13 weapons useable fissile material and transuranic wastes will have been removed from
14 RFETS and the related buildings will have been decontaminated and either demolished or
15 converted to non-DOE uses. Closure or conversion to non-DOE use of non-contaminated
16 buildings will be completed by the end of this period. Also by the end of this period, in
17 consultation with local officials, the Community Reuse Organization, and interested
18 members of the public, existing RFETS infrastructure will be essentially eliminated, except
19 for monitoring, and operation and maintenance of any remaining waste storage or disposal
20 facilities, or to support RFETS reuse activities, to the extent that it is paid for by the
21 users.

9. Definitions of terms used in this Preamble

24 The following description of terms used in this Preamble is provided for information. These are not
25 scientific definitions. They apply only to these terms as used in this Preamble.

28 a. Plutonium

29 Plutonium is found in the form of metals, oxides, solutions and residues. These materials are currently
30 in storage or will be recovered in the future.

33 b. Special Nuclear Material

34 Special nuclear material is plutonium, plutonium-uranium combinations, and enriched uranium. All of
35 RFETS's estimated 14.2 tons of plutonium is included within the broad definition of special nuclear
36 material. Although special nuclear material and plutonium largely overlap, the terms are listed separately
37 throughout the Preamble to address all forms of special nuclear material and to specifically identify the
38 objectives for plutonium.

41 c. Transuranic Waste

42 Transuranic waste is a radioactive waste contaminated with elements heavier than uranium (such as
43 plutonium and americium) in concentrations above 100 nanocuries per gram. Transuranic waste is both
process waste from past production activities as well as waste generated from building decontamination.

46 Typical transuranic waste at RFETS is similar to low-level waste but with generally higher levels of

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radioactivity. For the purposes of this Preamble, transuranic waste includes transuranic-mixed waste, which is transuranic waste that contains hazardous waste.

d. Low-Level Waste

Low-level waste is a radioactive waste that is not high-level waste, spent nuclear fuel, by-product material, or transuranic waste (although it may contain small amounts of transuranic elements). At RFETS, it exists in many forms such as rags, paper, plastic, glassware, filters, soils and some building rubble.

e. Low-Level Mixed Waste

Low-level mixed waste is low-level waste that contains hazardous waste.

f. Near-Term Site Condition

The Near-Term Site Condition is the time period during which the following activities will be completed: consolidation, stabilization and safe storage of plutonium, other special nuclear material and transuranic wastes; storage in a retrievable and monitored manner, disposal, and some removal of low-level, low-level mixed and other wastes; and nearly all cleanup activities. It is the intent of the Agencies to accelerate RFETS's activities to substantially achieve and complete risk reduction and cleanup during this period of time. Completion of activities in this period is anticipated to take about 8 to 15 years.

g. Intermediate Site Condition

The Intermediate Site Condition is the period of time during which all weapons useable fissile material, and transuranic wastes will be removed from RFETS. By the end of this period, none of these materials, nor the buildings that contained them, will remain. Also by the end of this period, all low-level, low-level mixed, hazardous, and solid wastes will have been shipped off-site, disposed, or stored in a retrievable and monitored manner to protect public health and the environment. Any remaining cleanup will be completed. Activities occurring in this period are anticipated to be completed about 12 to 20-25 years from now.

h. Weapons Useable Fissile Materials

Weapons useable fissile materials are materials that are not transuranic or low-level radioactive or mixed wastes and that contain any isotopes of Pu (except materials containing only Pu-238) and highly enriched uranium that contains at least 20 percent uranium-235.

i. Long-Term Site Condition

The Long-Term Site Condition follows the Intermediate Site Condition and continues through the indefinite future. Additional cleanup and removal activities may be conducted in this time period as funding, technology and political opportunities allow. While recognizing that some members of the public prefer cleanup to background levels, the Agencies are unable to commit to this goal. The Agencies will continue to explore new technologies to make further cleanup possible. The Parties will avoid taking actions that would, as a practical matter, preclude further cleanup in the long-term future. Activities

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beyond the Intermediate Site Condition are unknown, and perhaps unknowable, and are therefore not described.

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Based on the information available to the Parties on the effective date of this FEDERAL FACILITY AGREEMENT AND CONSENT ORDER (the Rocky Flats Cleanup Agreement ("RFCA" or "this Agreement")) and without trial or adjudication of any issues of fact or law, the Parties have exercised good faith and due diligence in establishing both the substantive and procedural requirements of this Agreement. The Parties believe, at the time this Agreement is executed, that the requirements of this Agreement are achievable. Therefore, the Parties agree as follows:

PART 1 JURISDICTION

1. The United States Environmental Protection Agency, Region VIII (EPA), enters this Agreement pursuant to sections 104, 106(a) and 120(e) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9604, 9606(a), and 9620(e), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), Pub. L. 99-499 (hereinafter jointly referred to as CERCLA); sections 6001, 3008(h), and 3004(u) and (v) of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§ 6961, 6928(h), 6924(u) and (v), as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA), Pub. L. 98-616 and the Federal Facility Compliance Act of 1992, Pub. L. No. 102-386 (hereinafter jointly referred to as RCRA); and Executive Orders 12088 and 12580.
2. The Colorado Department of Public Health and Environment (CDPHE) enters into this Agreement pursuant to sections 104(d), 120(f), 121, and 310 of CERCLA, 42 U.S.C. § 9604(d), 9620, and 9810; section 3006 of RCRA, 42 U.S.C. § 6926; the Colorado Hazardous Waste Act ("CHWA"), section 25-15-301(1) C.R.S. Pursuant to section 3006(b) of RCRA, 42 U.S.C. § 6926(b), on November 2, 1984, the Administrator of EPA authorized CDPHE to administer and enforce the State hazardous waste program in lieu of the federal program. CDPHE was authorized to regulate radioactive mixed waste on November 7, 1986, and was further authorized to administer and enforce certain portions of the HSWA amendments on July 14, 1989. CDPHE is the State agency designated by the CHWA, section 25-15-301(1) C.R.S. (1989), to implement and enforce the provisions of RCRA and CHWA. Requirements of this Agreement that relate to RCRA and CHWA are a Compliance Order on Consent issued by CDPHE pursuant to section 25-15-308(2), C.R.S. CDPHE also enters into this Agreement pursuant to the Colorado Air Pollution Prevention and Control Act, section 25-7-101, C.R.S., and, if delegation of the federal Clean Water Act program for the Rocky Flats Environmental Technology Site is received, the Colorado Water Quality Control Act, section 25-8-101, C.R.S.
3. The United States Department of Energy (DOE) enters into this Agreement pursuant to section 120(e) of CERCLA, 42 U.S.C. § 9620 (e); §§ 6001, 3008(h), and 3004(u) and (v) of RCRA, 42 U.S.C. §§ 6961, 6921(h), 6928(u) and (v); section 118 of the Clean Air Act, 42 U.S.C. § 7418; Executive Orders 12088 and 12580; and the Atomic Energy Act of 1954, as amended (AEA), 42 U.S.C. § 2011 et seq.

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4. The Parties agree that they are bound by this Agreement and that the requirements of this Agreement may be enforced against DOE pursuant to Parts 16 (Enforceability), 17 (Stipulated Penalties), and 18 (Reservation of Rights) of this Agreement or as otherwise provided by law. DOE consents to and will not contest EPA or State jurisdiction for the purposes of executing and enforcing this Agreement or its requirements.

5. The activities undertaken pursuant to this Agreement are regulated under CERCLA, the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300 (NCP), RCRA and CHWA and their implementing regulations, and other applicable State environmental law, and shall be implemented in accordance with all applicable statutes, regulations, and Executive Orders. If any new or amended statute or regulation pertinent to this Agreement becomes effective subsequent to the date of execution of this Agreement, any modifications to this Agreement made necessary by such changes in the law shall be incorporated by modification into this Agreement, and other modifications related to such changes in the law shall be subject to further negotiations. The Parties shall conduct an annual review of all applicable new and revised statutes and regulations and written policy and guidance to determine if an amendment pursuant to Part 19 (Amendment of Agreement) is necessary. Any reference in this Agreement to a statute shall include that statute's implementing regulations.

6. The 1991 Federal Facility Agreement and Consent Order, CERCLA VIII-91-03, RCRA (3008(h)) VIII-91-07 and State of Colorado Docket number 91-01-22-01, shall terminate and be replaced with this Agreement by consensus of the Parties, on the effective date of this Agreement as established pursuant to Part 33 (Effective Date) of the Agreement.

PART 2 PARTIES AND ROLE OF DOE CONTRACTORS

7. The Parties to this Agreement are EPA, CDPHE, and DOE.

8. The Parties acknowledge the guidance contained in the United States Office of Management and Budget Policy Letter 92-1 dated September 30, 1992, "Inherently Governmental Functions," as that guidance pertains to avoiding potential conflicts of interest by federal contractors. Accordingly, DOE will exercise independent judgment with respect to policy decisions associated with meeting the requirements of this Agreement. DOE shall be responsible for satisfying the requirements of this Agreement regardless of whether DOE carries out the requirements through its own employees, agents, and support contractors, or through its RFETS integrating management contractor. Upon the request of EPA and/or CDPHE, DOE shall provide the identity and work scope of employees, agents, and support contractors used in carrying out the requirements of this Agreement. Further, upon request of EPA and/or CDPHE, DOE shall provide the identity and work scope of its integrating management contractor and any first or second tier subcontractor used in carrying out the requirements of this Agreement.

PART 3 STATEMENT OF PURPOSE

9. The purpose of this Agreement is to establish the regulatory framework for achieving the ultimate cleanup of the Site. To further this purpose, the Parties have developed a set of general parameters to guide individual cleanup decisions, without predetermining those decisions. These parameters include assumptions regarding reasonably foreseeable future land and water uses,

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strategic approaches to cleanup, approaches to setting cleanup standards, options for interim storage and expectations for removal of plutonium, fate of existing buildings, and waste disposal. The parameters are contained in the Preamble to this Agreement as well as a broadly stated Rocky Flats Vision ("Vision"). Though the Preamble is not "enforceable" per se, the Parties intend that decisions made under this Agreement shall consider and reflect the objectives contained in the Vision and the Preamble.

10. In addition to the objectives expressed in the Preamble, the specific purposes of this Agreement are to:

- a. Ensure that the Parties work together in a cooperative spirit that facilitates the cost effective and timely cleanup of the Site; that promotes an orderly, effective investigation and cleanup of contamination at the Site; and that avoids litigation between the Parties.
- b. Ensure that the environmental impacts associated with activities at the Site will continue to be investigated and that appropriate response action is taken and completed as necessary to protect the public health, welfare, and environment.
- c. Provide an opportunity for review of response actions by the appropriate federal and State Natural Resources Trustees to minimize or eliminate potential injury to natural resources.
- d. Establish a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions at the Site and to ensure that such actions are conducted in accordance with CERCLA, RCRA, CHWA, and other applicable State and Federal environmental laws. In evaluating proposed activities, the Parties shall consider any relevant written guidance or policy.
- e. Reduce risks to RFETS workers, the public, and the environment through the cleanup process, in accordance with applicable standards and regulatory requirements.
- f. Seek ways to accelerate cleanup actions and eliminate unnecessary tasks and reviews, by requiring that the Parties to the Agreement work together, within each Party's statutory role, while fully involving other stakeholders as required by law and good practice.
- g. Provide the flexibility to modify the work scope and schedules, recognizing that priorities of specific tasks and schedules may change as the cleanup progresses due to emerging information on Site conditions, risk priorities, and available resources.
- h. Provide for appropriate regulation or oversight of activities in contaminated buildings consistent with the following principles:
 - (1) a single set of protocols or a single process;
 - (2) where possible, a single regulator for regulation or oversight;
 - (3) timely reviews;
 - (4) a bias for action; and
 - (5) appropriate accountability of all Parties.

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- i. Ensure early and meaningful public involvement, including local elected officials, local government managers, RFLII, CAB, other groups and citizens in the implementation of this Agreement, in the development and review of strategic plans, and in the initiation, development and selection of remedial actions to be undertaken at the Site, including timely review of applicable data, reports, and action plans developed for the Site.
- j. Establish non-enforceable target dates regarding the removal of weapons-useable fissile material from RFETS. The Parties will review these targets in the year 2000, modify them as necessary or appropriate, and establish them as enforceable commitments from that date forward. The enforceable commitments may carry financial incentives/disincentives, and will be framed to operate within the regulatory framework existing at the time of adoption (2000). The non-enforceable target dates below are established at this time for inclusion in this Agreement:
 - (1) DOE will begin to remove weapons-useable fissile material from RFETS as soon as possible, but no later than 2010.
 - (2) DOE will complete the removal of weapons-useable fissile material from RFETS by 2015.
- k. Conduct the remediation of contamination at the Site in a manner that is consistent with the Vision and the Preamble.
- l. Substantially reduce the costs of cleanup activities at the Site through improved project management, greater involvement of regulators in DOE's planning and budgeting processes, increased reliance on accelerated actions, improved oversight of cleanup, greater use of consultative approaches, elimination of unnecessary procedures, and streamlining of other procedures.
- m. Establish one set of consistent requirements for the performance of a RCRA Facility Investigation/Remedial Investigation (RFI/RI) for OUs at the Site as appropriate to determine the nature and extent of the threat to the public health or welfare or the environment caused by the release or threatened release of hazardous substances, pollutants, contaminants, hazardous waste or constituents at the Site; and to establish one set of consistent requirements for the performance of a Corrective Measures Study/Feasibility Study (CMS/FS) for OUs at the Site, as appropriate, to identify, evaluate, and select alternatives for the appropriate remedial/corrective action(s) to prevent, mitigate, or abate the release or threatened release of hazardous substances, pollutants, contaminants, hazardous waste or constituents at the Site in accordance with CERCLA, RCRA, CHWA, and other applicable State environmental law.
- n. Describe the roles and responsibilities of the Parties.
- o. Coordinate all of DOE's cleanup obligations under CERCLA, RCRA, and CHWA in a single agreement to streamline compliance with these three statutes.
- p. Establish a process for identifying the applicable or relevant and appropriate legal requirements for response action(s) regulated under CERCLA.

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- q. Provide for continued operation and maintenance of the selected remedial/corrective action(s) as appropriate.
- r. Establish a procedural framework and schedule such that the remedial investigation and response actions selected and implemented by the Parties are sufficient to meet the criteria and procedures for the Site's timely removal and delisting from the NPL.

PART 4 STATUTORY COMPLIANCE/RCRA-CERCLA COORDINATION

- 11. The Parties intend to use this Agreement to coordinate DOE's CERCLA response obligations, CHWA closure obligations for hazardous waste management units identified in this Agreement, and CHWA and RCRA corrective action obligations. Therefore, the Parties intend that compliance with the requirements of this Agreement will be deemed to achieve compliance with:
 - a. CERCLA, 42 U.S.C. § 9601 et seq., and specifically that the cleanup at the Site will satisfy all applicable or relevant and appropriate federal and State laws and regulations, to the extent required by section 121 of CERCLA, 42 U.S.C. § 9621;
 - b. the corrective action requirements of sections 3004(u) and (v) of RCRA, 42 U.S.C. § 6924(u) and (v), for a RCRA permit, and section 3008(h), 42 U.S.C. § 6928(h), for interim status facilities;
 - c. the corrective action requirements of CHWA, including 6 CCR 1007-3 sections 264.101 and 265.5; and
 - d. the closure requirements of CHWA for those hazardous waste management units identified in Attachment 3.
- 12. The Parties also intend to coordinate the remedial activities that are regulated under this Agreement with requirements of the Federal Facility Compliance Act to develop a plan or agreement for treatment of mixed waste generated by actions required under this Agreement. This coordination will occur as follows:
 - a. For mixed wastes generated under this Agreement that will not be treated by the mixed waste treatment capacity developed to treat non-remedial wastes in accordance with the then applicable Site Treatment Plan and Order enforced by CDPHE, the state portion of the relevant decision document shall constitute the order required under 42 U.S.C. § 6939c(b)(5).
 - b. For mixed wastes generated under this Agreement that will be treated by the mixed waste treatment capacity developed to treat non-remedial wastes in accordance with the then applicable Site Treatment Plan and Order enforced by CDPHE, compliance with 42 U.S.C. § 6939c(b)(5) shall be regulated under the then applicable Site Treatment Plan and Order enforced by CDPHE, and shall not be enforced under this Agreement.

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13. The Parties recognize that:

- a. DOE is obligated to comply with applicable requirements of RCRA, CHWA, CERCLA, and State environmental law for all remedial activities under this Agreement;
- b. the coordination of these statutory requirements under this Agreement in no way diminishes DOE's obligations;
- c. the inclusion of these statutory requirements in a single document serves to facilitate DOE's efficient compliance with these statutory requirements; and
- d. the Agreement is a single document that has dual purposes of serving as both a CERCLA § 120 Interagency Agreement and a CHWA corrective action order; the requirements of both are enforceable by the Parties.

14. The Parties intend that any final response action selected, implemented, and completed under this Agreement shall be deemed by the Parties to be protective of human health and the environment such that remediation of releases covered by this Agreement shall obviate the need for further action outside the scope of this Agreement to protect human health or the environment for those same releases. While the Parties intend to minimize any residual injury to natural resources, completion of work pursuant to this Agreement does not bar a claim by the State for natural resource damages.

15. DOE is subject to a CHWA permit that contains provisions governing corrective action for releases of hazardous wastes or constituents at the Site. These corrective action provisions were drawn from the Statement of Work element of the 1991 Interagency Agreement. The Parties recognize the continuing need to ensure consistency between the corrective action requirements of the permit and the requirements of this Agreement, and agree to take such actions as are necessary to accomplish this goal. Therefore, the Parties agree that when this Agreement becomes effective, CDPHE shall issue a permit modification to remove the "Statement of Work" references from Part 15 of the CHWA permit and the Attachments section of the CHWA Permit, and to incorporate the following language as the corrective action requirement of the CHWA permit:

There have been releases of hazardous wastes and constituents from solid waste management units into the environment at Rocky Flats. Accelerated corrective and remedial actions to address these releases are being regulated by the Department [CDPHE] and EPA under the Rocky Flats Cleanup Agreement, Compliance Order on Consent No. 96-XX-XX-01 ("RFCA"). Following implementation of these accelerated corrective and remedial actions, the Department [CDPHE] will be making a final corrective action decision for each OU. The final corrective action decisions will be incorporated as modifications to this permit. If the RFCA is terminated before all corrective action has been taken, this permit shall be modified to incorporate requirements of the RFCA that are requirements of CHWA.

16. The Parties recognize that under section 121(e)(1) of CERCLA, portions of the response actions required by this Agreement and conducted entirely on the Site are exempted from the procedural

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requirement to obtain federal, state, or local permits, when such response action is selected and carried out in compliance with section 121 of CERCLA. It is the understanding of the Parties that the statutory language is intended to avoid delay of on-Site response actions, due to procedural requirements of the permit process. The Parties agree that the following activities are being approved, at least in part, pursuant to CERCLA authorities:

- a. removal or remedial actions in the Buffer Zone (except as provided below with respect to a retrievable, monitored storage or disposal facility);
- b. decommissioning activities;
- c. activities required under any concurrence CAD/ROD; and
- d. remedial actions in the Industrial Area for hazardous substances that are not also hazardous wastes or hazardous constituents (e.g., radionuclides that are not mixed wastes and PCBs).

Therefore, no permits are required for the activities described in (a)-(d) above. Subject to paragraph 98, DOE agrees to seek and implement any federal, state or local permits, including RCRA or CHWA permits, for operations or processes required to implement activities regulated under this Agreement, other than those listed in (a)-(d) above. Notwithstanding subparagraph (a) above, an action to construct and operate a retrievable, monitored storage or disposal facility as described in paragraph 80 in the Buffer Zone will be submitted for review and approval pursuant to State authorities under this Agreement, and such action must obtain all applicable permits as provided in this Agreement. Notwithstanding subparagraph (c) above, this Agreement does not constitute an admission by any Party as to whether permits would be required if EPA and CDPHE do not issue concurrence CAD/RODs. In such a case, the provisions of Parts 15 (Dispute Resolution) and 18 (Reservation of Rights) may be applied.

17. When DOE proposes a response action regulated under CERCLA that, in the absence of CERCLA section 121(e)(1) and the NCP, would require a federal or State permit, DOE shall include in the submittal:

- a. Identification of each permit which would otherwise be required.
- b. Identification of the standards, requirements, criteria, or limitations which would have had to have been met to obtain each such permit.
- c. Explanation of how the response action proposed will meet the standards, requirements, criteria, or limitations identified in subparagraph 17b immediately above.

18. Upon the request of DOE, EPA and CDPHE will provide their positions with respect to paragraphs 17b and 17c above in a timely manner.

19. This Part is not intended to relieve DOE from any applicable requirements for the shipment or movement of hazardous waste or hazardous substances off the RFETS. DOE shall obtain all permits and comply with applicable federal, State, or local laws for such shipments. DOE shall submit timely applications and requests for such permits and approvals. Disposal of hazardous substances off-site shall comply with DOE's Policy on Off-Site Transportation, Storage, and Disposal of Nonradioactive Hazardous Waste, dated June 24, 1986, and the EPA Off-Site

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Response Action Policy, dated May 6, 1985, 50 Fed. Reg. 45933 (November 5, 1985), as amended by EPA's November 13, 1987, "Revised Procedures for Planning and Implementing Off-Site Response Actions" and as subsequently amended.

20. DOE shall notify CDPHE and EPA in writing of any permits RFETS is required to obtain for off-site activities related to this Agreement as soon as it becomes aware of the requirement. Upon request, DOE shall provide CDPHE and EPA with copies of all such permit applications and other documents related to the permit process.
21. If a permit necessary for implementation of activities related to this Agreement is not issued or is issued or renewed in a manner that is materially inconsistent with the requirements of this Agreement, DOE shall notify CDPHE and EPA of its intention to modify the baseline and/or propose changes to regulatory milestones to comply with the permit (or lack thereof). DOE shall notify EPA and CDPHE in writing of its intention to propose changes within 10 business days of receipt by DOE of notification that: (1) a permit will not be issued; (2) a permit has been issued or reissued; or (3) a final determination with respect to any appeal related to the issuance of a permit has been entered. Within 30 days from the date it submits its notice of intention to propose changes, DOE shall submit to CDPHE and EPA its proposed changes with an explanation of its reasons in support thereof.
22. CDPHE and EPA shall review any of DOE's proposed changes to regulatory milestones submitted pursuant to the preceding paragraph. If DOE submits proposed changes to regulatory milestones prior to a final determination of any appeal taken on a permit needed to implement this Agreement, CDPHE and EPA may elect to delay review of the proposed changes until after such final determination is entered. If CDPHE and EPA elect to delay review, DOE shall continue implementation of this Agreement as provided in the following paragraph. If EPA and CDPHE fail to agree to a proposed change to any regulatory milestones within 30 days of such proposal, DOE may invoke the Dispute Resolution procedures of Subpart 15E or 15B, as appropriate.
23. During any appeal of any permit required to implement this Agreement or during review of any of DOE's proposed changes to regulatory milestones as provided in the preceding paragraph, DOE shall continue to implement those portions of this Agreement which can be reasonably implemented pending final resolution of the permit issue(s).
24. Some of the activities regulated under this Agreement may also be subject to the oversight of the Defense Nuclear Facility Safety Board (DNFSB). To ensure coordination of the DNFSB's oversight role with the regulation of such activities under this Agreement, the Parties and the DNFSB have entered into a Memorandum of Understanding, a copy of which is found in Appendix 1.

PART 5 DEFINITIONS

25. If there is an inconsistency between CERCLA, RCRA, and CHWA with respect to the following definitions, the Agreement's definition controls. If there is no definition in this Agreement, but there is an inconsistency between the statutory definitions for CERCLA, RCRA, and CHWA,

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including their related regulatory definitions, the definitions in CERCLA and the NCP shall control. The following definitions are used for the purposes of this Agreement:

- a. Accelerated Actions means those expedited response actions approved as a Proposed Action Memorandum, Interim Measure/Interim Remedial Action, or RSOP.
- b. Additional work means work that is both (1) required by EPA and/or CDPHE after milestone setting for the current fiscal year, and (2) is not already included in the baseline.
- c. Administrative Record shall refer to the compilation of documents which establishes the basis of all removal and remedial action decisions for each OU at the Site, as required by section 113(k)(1) of CERCLA.
- d. Rocky Flats Cleanup Agreement, "this Agreement" or RFCA means the body of this Agreement (pages 1-84) and all Attachments, Amendments, approved documents, other approvals by the LRA or both EPA and CDPHE, as appropriate, final written resolution of any dispute, and amendments to this document, but does not include Appendices. All requirements in such Attachments, Amendments, approved documents, LRA approvals, work description documents, and amendments shall be incorporated into this Agreement. Approved documents, other approvals, and final resolutions of dispute shall not be physically attached to this document. Appendices to this Agreement are related, but separate documents that are appended for convenience only. Appendices do not constitute parts of this Agreement.
- e. Annual Cost Baseline means a subset of the Integrated Sitewide Baseline that DOE will establish each fiscal year incorporating the RFETS funding allocation for that fiscal year to measure and control progress during that fiscal year.
- f. Approval, in relation to documents, means CDPHE and/or EPA formal consent that a document delivered for review pursuant to this Agreement contains the requisite information at the appropriate level of detail to comply with this Agreement.
- g. Atomic Energy Act or AEA means the Atomic Energy Act of 1954, as amended, 42 U.S.C. § 2011 et seq. and its implementing regulations.
- h. Authorized Representative shall include a Party's contractors or agents acting within the scope of specifically defined authority.
- i. Baseline or Integrated Sitewide Baseline describes the current scheduled scope of work for RFETS and the Site presented in a manner that is resource loaded and integrated across all Site activities using standard industry project management techniques and practices. It will present the quantitative cost, schedule, and technical performance for a given activity and will be available for use as a standard against which to measure and control progress during the performance of the work that the baseline describes.
- j. Buffer Zone means that area of RFETS designated on the map attached hereto as Attachment 2 and generally described as the roughly 6000 acres unoccupied by buildings

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- 1 or development that surrounds the Industrial Area at the geographic center of RFETS and
2 extends to its borders.
- 3
- 4 k. Building and equipment disposition standards means standards establishing levels of
5 residual contamination that must be achieved to allow disposition of buildings and
6 equipment. These standards may vary with the nature of the disposition, i.e., whether the
7 buildings and equipment are proposed to be released for use by persons other than DOE,
8 are to be placed in an on-site storage or disposal facility, or are to be closed in place.
- 9
- 10 l. CAPPCA means the Colorado Air Pollution Prevention and Control Act, § 25-7-101 et
11 seq., C.R.S., and implementing regulations.
- 12
- 13 m. CERCLA means the Comprehensive Environmental Response, Compensation, and
14 Liability Act, 42 U.S.C. § 9601 et seq., as amended by the Superfund Amendments and
15 Reauthorization Act of 1986 (SARA), Pub. L. 99-499, and the Community Environmental
16 Response Facilitation Act (CERFA), Pub. L. No. 102-26; and the NCP and other
17 implementing regulations.
- 18
- 19 n. CHWA Permit means a permit issued under CHWA for treatment, storage, or disposal of
20 hazardous waste.
- 21
- 22 o. CDPHE means the Colorado Department of Public Health and Environment and/or any
23 predecessor and successor agencies, their employees, and authorized representatives.
- 24
- 25 p. Closure, in the context of RCRA/CHWA hazardous waste management units, means
26 actions taken by an owner or operator of a treatment, storage, or disposal unit to
27 discontinue operation of the unit in accordance with the performance standards specified
28 in 6 CCR 1007, § 264.111 or § 265.111, as appropriate.
- 29
- 30 q. Colorado Hazardous Waste Act (CHWA) means sections 25-15-101 et seq., C.R.S. (1982
31 & Supp.) as amended, and its implementing regulations.
- 32
- 33 r. Community Relations Plan or CRP means that plan described in 40 CFR 300.430(c)(ii).
- 34
- 35 s. Corrective Action (CA) means the RCRA/CHWA term for the cleaning up of releases of
36 hazardous waste or hazardous constituents.
- 37
- 38 t. Corrective Action Decision (CAD) means the CHWA permit decision by the State
39 selecting a corrective measure alternative or alternatives to remediate environmental
40 concerns at an OU.
- 41
- 42 u. Corrective Action Management Unit means an area within a facility that is designated by
43 CDPHE under Part 264 Subpart S, for the purpose of implementing corrective action
44 requirements under sections 264.101, 265.5, or section 25-15-308, C.R.S. A CAMU shall
45 only be used for the management of remediation wastes pursuant to implementing such
46 corrective action requirements at the facility (6 CCR 1007-3 §260.10).

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- v. Corrective Measures Study (CMS) means the RCRA/CHWA term for the study through which the owner/operator of a facility identifies and evaluates appropriate corrective measures and submits them to the regulatory agency. The CMS and the CERCLA Feasibility Study are analogous documents and may be the same document.
- w. Cost Savings means cost and productivity savings that result in excess funds being available after completion of particular activities within a fiscal year. Any such savings shall be calculated with reference to the approved RFETS Annual Cost Baseline and RFETS's EM funding allocation, including any rescissions. Cost savings do not include mere deferral of activities. Cost savings are evaluated periodically throughout the fiscal year.
- x. Days means calendar days unless business days are specified. Any submittal or Written Statement of Dispute that, under the requirements of this Agreement, would be due on a Saturday, Sunday, or State of Colorado or federal holiday shall be due on the following business day.
- y. Deactivation means the process of placing a building, portion of a building, structure, system, or component (as used in the rest of this paragraph, "building") in a safe and stable condition to minimize the long-term cost of a surveillance and maintenance program in a manner that is protective of workers, the public, and the environment. Actions during deactivation could include the removal of fuel, draining and/or de-energizing of nonessential systems, removal of stored radiological and hazardous materials and related actions. As the bridge between operations and decommissioning, based upon Decommissioning Operations Plans or the Decommissioning Program Plan, deactivation can accomplish operations-like activities such as final process runs, and also decontamination activities aimed at placing the building in a safe and stable condition. Deactivation does not include decontamination necessary for the dismantlement and demolition phase of decommissioning, i.e., removal of contamination remaining in fixed structures and equipment after deactivation. Deactivation does not include removal of contaminated systems, system components, or equipment except for the purpose of accountability of SNM and nuclear safety. It also does not include removal of contamination except as incidental to other deactivation or for the purposes of accountability of SNM and nuclear safety.
- z. Decommissioning means, for those buildings, portions of buildings, structures, systems or components (as used in the rest of this paragraph, "building") in which deactivation occurs, all activities that occur after the deactivation. It includes surveillance, maintenance, decontamination and/or dismantlement for the purpose of retiring the building from service with adequate regard for the health and safety of workers and the public and protection of the environment. For those buildings in which no deactivation occurs, the term includes characterization as described in Attachment 9, surveillance, maintenance, decontamination and/or dismantlement for the purpose of retiring the building from service with adequate regard for the health and safety of workers and the public and protection of the environment. The ultimate goal of decommissioning is unrestricted use or, if unrestricted use is not feasible, restricted use of the buildings.

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- 1 aa. Decontamination means the removal or reduction of radioactive or hazardous
2 contamination from facilities, equipment or soils by washing, heating, chemical or
3 electrochemical action, mechanical cleaning or other techniques to achieve a cleaner stated
4 objective or end condition.
5
6 ab. Dismantlement means the demolition and removal of any building or structure or a part
7 thereof during decommissioning.
8
9 ac. DOE or U.S. DOE means the United States Department of Energy and/or any predecessor
10 or successor agencies, their employees, and authorized representatives.
11
12 ad. Environmental Management or EM means the division within DOE responsible, inter alia,
13 for cleanup and waste management at DOE's nuclear defense facilities, including the
14 preparation and oversight of the budget for such activities and all successor divisions.
15
16 ae. EPA or U.S. EPA means the United States Environmental Protection Agency and any
17 successor agencies, its employees, and authorized representatives.
18
19 af. Feasibility Study (FS) means the CERCLA term for a study undertaken to develop and
20 evaluate options for remedial action.
21
22 ag. Field modification means a modification to work triggered as a result of encountering
23 unanticipated conditions in the field and which must be done immediately in the opinion
24 of a Project Coordinator to avoid either an imminent threat to human health, safety or the
25 environment, or undue and unnecessary delay. Field modifications may also be made
26 when opportunities are identified that allow the work to be conducted in a more cost-
27 effective manner while not compromising safety or protection of public health or the
28 environment.
29
30 ah. Fiscal Year (FY) denotes the current fiscal year. The federal fiscal year starts on October
31 1 and ends on September 30 of the following year. The federal fiscal year is designated
32 by the calendar year in which it ends. For example, FY96 started on October 1, 1995 and
33 ends on September 30, 1996. FY+1 means the federal budget year following the present
34 FY. FY+2 means the federal budget year following FY+1. FY-1 means the federal
35 budget year preceding the present FY.
36
37 ai. Historical Release Report or HRR means that report required by CERCLA § 103(c)
38 describing the known, suspected or likely releases of hazardous substances from RFETS.
39
40 aj. Implementation Guidance Document (IGD) means the guidance document that the Parties
41 agree DOE will use in preparing work documents for activities regulated by the
42 Agreement. The IGD contains information regarding the technologic approach to
43 remedial/corrective actions and the activities regulated under this Agreement. The IGD
44 provides guidance for what is to be included in specific decision documents, how to
45 implement accelerated actions, RFI/RIs and CMS/FSs and the methodologies to assess
46 human health and ecologic risk.

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- 1 ak. Individual Hazardous Substance Site (IHSS) means specific locations where solid wastes,
2 hazardous substances, pollutants, contaminants, hazardous wastes, or hazardous
3 constituents may have been disposed or released to the environment within the Site at any
4 time, irrespective of whether the location was intended for the management of these
5 materials.
- 6 al. Industrial Area means that area of RFETS designated on the map attached hereto as
7 Attachment 2 and generally described as the roughly 350 acres at the geographic center
8 of RFETS which is occupied by the 400 buildings, other structures, roads and utilities
9 where the bulk of RFETS mission activities occurred between 1951 and 1989.
- 10 am. Interim Measure (IM) means the RCRA/CHWA term for a short term action to respond
11 to imminent threats, or other actions to abate or mitigate actual or potential releases of
12 hazardous wastes or constituents.
- 13 an. Interim Remedial Action (IRA) means the CERCLA term for an expedited response action
14 performed in accordance with remedial action authorities to abate or mitigate an actual or
15 potential threat to public health, welfare, or the environment from the release or threat of
16 release of a hazardous substance from RFETS.
- 17 ao. Intermediate Site Condition is the period of time during which all weapons useable fissile
18 material and transuranic wastes will be removed from RFETS. By the end of this period,
19 none of these materials, nor the buildings that contained them, will remain. Also by the
20 end of this period, all low-level, low-level mixed, hazardous, and solid wastes will have
21 been shipped off-site, disposed, or stored in a retrievable and monitored manner to protect
22 public health and the environment. Any remaining cleanup will be completed. Activities
23 occurring in this period are anticipated to be completed about 12 to 20-25 years from now.
- 24 ap. Land Disposal Unit means a landfill, surface impoundment, waste pile, injection well, land
25 treatment facility, salt dome formation, salt bed formation, underground mine or cave, or
26 concrete vault or bunker intended for disposal purposes (6 CCR 1007-3 § 268.2(c)).
- 27 aq. Lead Regulatory Agency (LRA) is that regulatory agency (EPA or CDPHE) which is
28 assigned approval responsibility with respect to actions under this Agreement at a
29 particular Operable Unit pursuant to Part 8. In addition to its approval role, the LRA will
30 function as the primary communication and correspondence point of contact. The LRA
31 will coordinate technical reviews with the Support Regulatory Agency and consolidate
32 comments, assuring technical and regulatory consistency, and assuring that all regulatory
33 requirements are addressed.
- 34 ar. Major modification means a modification to work that constitutes a significant departure
35 from the approved decision document or the basis by which a decision was previously
36 made or approved, e.g., a change in a selected remedial technology, a technical
37 impracticability determination, or a significant change to the performance of an SOP (e.g.,
38 a tank closure that results in closure in-place versus removal) that fundamentally alters the
39 pre-approved procedure.

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- 1 as. Minor modification means a modification that achieves a substantially equivalent level of
2 protection of workers and the environment and does not constitute a significant departure
3 from the approved decision document or the basis by which a decision was previously
4 made or approved, but may alter techniques or procedures by which the work is
5 completed, e.g., a change in an RSOP that does not change the final result of the activity
6 (e.g., alteration to a tank closure procedure that still results in a clean closure), or a
7 change in operation or capacity of a treatment system that does not cause the system to
8 exceed an effluent limit.
- 9
- 10 at. Mixed Waste or Radioactive Mixed Waste means waste that contains both hazardous waste
11 and radioactive materials classified as source, special nuclear, or by-product material
12 subject to the AEA of 1954 (42 U.S.C. § 2011 et seq.)
- 13
- 14 au. Natural Resource Trustee means a federal or State official who acts as a trustee on behalf
15 of the public to oversee natural resources, and to recover Natural Resource Damages as
16 appropriate. With respect to the Site, the following officials have been designated as
17 Natural Resource Trustees:
- 18
- 19 -- Secretary of Energy (DOE)
 - 20 -- Secretary of Interior (DOI)
 - 21 -- Executive Director of the Colorado Department of Public Health and Environment
22 (CDPHE)
 - 23 -- Colorado Attorney General (AG)
 - 24 -- Deputy Director of the Colorado Department of Natural Resources (CDNR)
- 25
- 26 av. No Action/No Further Action or NA/NFA means the determination that remedial actions
27 (or further remedial actions) are not presently warranted; however, NA/NFA decisions are
28 subject to revisitation at the time of the CAD/ROD in accordance with Attachment 6, and
29 are also subject to paragraph 238 (Reservation of Rights) and to the CERCLA § 121(c)
30 mandate for a five-year review of remedial actions that result in hazardous substances,
31 pollutants, or contaminants remaining at the Site.
- 32
- 33 aw. Operable Unit (OU) means a grouping of IHSSs into a single management unit.
- 34
- 35 ax. Proposed Action Memorandum or PAM means the decision document that describes an
36 accelerated cleanup activity which DOE expects can be completed during a six-month
37 period.
- 38
- 39 ay. RCRA means the Resource Conservation and Recovery Act, 42 U.S.C. § 6901 et. seq.,
40 as amended by the Hazardous and Solid Waste Amendments of 1984, the Federal Facility
41 Compliance Act of 1992, and implementing regulations.
- 42
- 43 az. RCRA Facilities Investigation (RFI) means the RCRA/CHWA term for an investigation
44 conducted by the owner/operator of a facility to gather data sufficient to characterize the
45 nature, extent, and rate of migration of contamination from releases identified at the
46 facility. The RFI and the CERCLA RI are analogous documents, and may be the same
47 document.

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- 1 ba. Record of Decision (ROD) means the CERCLA decision by DOE and EPA, or by EPA
2 alone in the event EPA disagrees with a remedy proposed by DOE, selecting the remedial
3 action or actions to remedy environmental and human health concerns at the Site.
- 4 bb. Regulated Unit means a surface impoundment, waste pile, and land treatment unit or
5 landfill that receives hazardous waste after July 26, 1982 (6 CCR 107-3 § 264.90(a)(2)).
- 6 bc. Regulatory Milestone or "milestone" means the date for which a particular event is
7 established in accordance with this Agreement. Regulatory milestones also include dates
8 for activities regulated under this Agreement which follow the completion of target
9 activities related to the management of special nuclear material at RFETS as identified in
10 Appendix 6 of this Agreement (e.g., a milestone associated with decommissioning which
11 can only be accomplished after certain special nuclear material management activities are
12 completed). Failure to meet the requirements of a regulatory milestone shall trigger
13 liability for stipulated penalties.
- 14 bd. Remedial Activities means activities regulated under one or more of the following statutory
15 authorities: RCRA or CHWA closure requirements for hazardous waste management units
16 specified in this Agreement; RCRA or CHWA corrective action requirements; or
17 CERCLA sections 104 or 106.
- 18 be. Remedial Investigation (RI) means the CERCLA term for an investigation to collect data
19 necessary to adequately characterize the Site, assess the risks to human health and the
20 environment, and to support the development and evaluation of remedial alternatives.
- 21 bf. Remediation waste means all:
- 22 (1) solid, hazardous, and mixed wastes;
- 23 (2) all media and debris that contain hazardous substances, listed hazardous or mixed
24 wastes or that exhibit a hazardous characteristic; and
- 25 (3) all hazardous substances
- 26 generated from activities regulated under this Agreement as RCRA corrective actions or
27 CERCLA response actions, including decommissioning. Remediation waste does not
28 include wastes generated from other activities. Nothing in this definition confers RCRA
29 or CHWA authority over source, special nuclear, or byproduct material as those terms are
30 defined in the Atomic Energy Act.
- 31 bg. Requirements of this Agreement means provisions of this Agreement that specify:
- 32 (1) actions DOE must perform to accomplish the activities regulated under this
33 Agreement;
- 34 (2) dates by which it must perform such actions;
- 35 (3) standards which DOE must achieve through such actions; or

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(4) the manner in which such actions must be reviewed, approved, performed and overseen to comply with this Agreement and applicable environmental laws.

"Requirements of this Agreement" also includes all federal and state applicable or relevant and appropriate requirements (ARARs) incorporated in any ROD or other decision document.

- bh. Response Action means a "response action" under CERCLA or a corrective action or closure under RCRA or CHWA.
- bi. Retrievable Monitored Storage facility means a hazardous waste management unit that is utilized for the long-term storage of hazardous and/or mixed waste which is monitored and which is designed to allow retrieval of waste for treatment and/or disposal.
- bj. Rocky Flats Environmental Technology Site ("RFETS") means the property owned by the United States Government, formerly known as the Rocky Flats Plant or Rocky Flats Site, and now known as the Rocky Flats Environmental Technology Site, including the Buffer Zone, as identified in the map in Attachment 2. RFETS does not include contaminated areas beyond the facility property boundary. When the term "site" is used with a lower case "s", it means RFETS.
- bk. Scoping or Scoping Phase means that period of time, from initial conceptual development of proposed work to DOE's formal request for approval to perform work on an activity, during which DOE consults with the regulators regarding the goals, methods, breadth and desired outcome for such activity.
- bl. the Site (when used with upper case "S", except in the phrase Rocky Flats Environmental Technology Site) means all contaminated areas of the Rocky Flats Environmental Technology Site and all contiguous or nearby areas that are contaminated by hazardous substances, pollutants, or contaminants (as those terms are defined in section 101 of CERCLA) and/or hazardous wastes or hazardous constituents (as those terms are defined in section 1004 of RCRA or 6 CCR 1007-3, Part 260) from sources at RFETS.
- bm. Solid Waste Management Unit (SWMU) means any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released (Proposed definition 55 FR 30808, July 27, 1990).
- bn. Special nuclear material (SNM). The term "special nuclear material" means plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material determined to be SNM pursuant to the Atomic Energy Act. 42 U.S.C. sec. 2014 (aa).
- bo. RFCA Standard Operating Protocols (RSOP) means approved protocols applicable to a set of routine environmental remediation and/or decommissioning activities regulated under this Agreement that DOE may repeat without re-obtaining approval after the initial

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approval because of the substantially similar nature of the work to be done. Initial approval of an RSOP will be accomplished through an IM/IRA process.

- bp. State means the State of Colorado, its employees, and authorized representatives.
- bq. Submittal means every document, report, schedule, deliverable, Work Description Document, or other item to be submitted to EPA and CDPHE pursuant to this Agreement.
- br. Support Regulatory Agency (SRA) means the regulatory agency (EPA or CDPHE) that, for purposes of streamlining implementation of this Agreement, where applicable, shall defer exercise of its regulatory authority at one or more particular OUs until the completion of all accelerated actions. The SRA may, however, provide comments to the LRA regarding proposed documents and work.
- bs. Target activities means those activities identified in Appendix 6 relating to DOE's management of special nuclear materials at RFETS. Target activities shall not be considered requirements of this Agreement. However, the Parties recognize that completion of target activities may be necessary to mitigate risks to worker and public health or the environment, and to meet subsequent regulatory milestones.
- bt. Treatment, Storage, or Disposal Unit (TSD Unit) means a hazardous waste treatment, storage, or disposal unit which is required to be permitted and/or closed pursuant to RCRA and CHWA requirements as determined in the baseline.
- bu. TRU waste means waste that, without regard to source or form, is contaminated with alpha-emitting transuranium radionuclides with half-lives greater than 20 years and concentrations greater than 100nCi/g at the time of assay.
- bv. TRU-mixed waste means TRU waste mixed with hazardous waste.
- bw. Weapons Useable Fissile Materials are (1) materials that are not transuranic or low-level radioactive or mixed wastes and that contain any isotopes of Pu (except materials containing only Pu-238) and (2) highly enriched uranium that contains at least 20 percent uranium-235.
- bx. Work Description Documents means the detailed plans developed to implement work approved under this Agreement.

PART 6 LEGAL BASIS OF AGREEMENT

26. This Part constitutes a summary of the Findings of Facts and Conclusions of Law upon which CDPHE and EPA are proceeding for purposes of this Agreement. The Findings of Fact and Conclusions of Law stated in this Agreement shall not be considered admissions by DOE. However, DOE agrees not to contest the Findings of Fact or Conclusions of Law stated in this Agreement related to EPA and State authority to enforce the requirements of this Agreement.

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Subpart A. Findings of Fact

27. The United States, through the U.S. Atomic Energy Commission, acquired land and established the Rocky Flats Plant in 1951. The Rocky Flats Plant began operation in 1952. The Plant's primary mission was the production of component parts for nuclear weapons. In February 1991, DOE introduced a plan to realign the Nation's nuclear weapons production program. As part of the realignment, the nuclear production functions of RFETS have been relocated to other sites (56 FR 55921). In addition, the Secretary of Energy announced in a February, 1992, Report to Congress that RFETS would no longer have a nuclear weapons mission. As a result of this realignment, RFETS' mission has changed.
28. RFETS consists of 6262 acres of federally owned land plus property beyond the boundaries that has become contaminated from sources within the boundaries of the federally-owned property. RFETS is located approximately 16 miles northwest of downtown Denver and is almost equidistant from the cities of Boulder, Golden, Westminster, and Arvada. In addition to these cities, several other communities are located near the Site, including Louisville, Lafayette, Superior, and Broomfield. Major plant structures are located within an area of 384 acres.
29. The 1994 population within a 50-mile radius of Denver consisted of approximately 2.2 million people. There are approximately 300,000 people living within 10 miles of RFETS. The surface water drainage from RFETS flows to the east and RFETS is located directly west of two drinking water reservoirs for the northern metropolitan area of Denver. The Great Western Reservoir services the City of Broomfield, and Standley Lake services the cities of Westminster, Thornton, and Northglenn. DOE has funded the construction of two major water management projects to isolate both the Great Western Reservoir and Standley Lake from any potential surface water contamination which might flow from RFETS. The Standley Lake Protection Project (i.e., Woman Creek Reservoir) was completed in early 1996 and will divert Woman Creek flows around Standley Lake. The Great Western Reservoir Replacement Project is expected to be completed in early 1997. When completed, it will provide an alternate water supply to the City of Broomfield, after which Great Western Reservoir should no longer be used as a drinking water source. Land uses adjacent to RFETS are agricultural to the west, agricultural with some industrial to the south, agricultural and very-low-density residential to the east, and agricultural and local government owned open space to the north.
30. Since establishment of the nuclear weapons production plant in 1951, materials defined as hazardous substances, pollutants, and contaminants by CERCLA, and materials defined as hazardous waste and hazardous constituents by RCRA and/or CHWA, have been produced and disposed or released at various locations at RFETS, including, but not limited to TSD Units. Certain hazardous substances, contaminants, pollutants, hazardous wastes, and hazardous constituents have been detected and remain in groundwater, sediments, surface water, and soils at the Site. Groundwater, soils, sediments, surface water, and air pathways provide routes for migration of hazardous substances, pollutants, contaminants, hazardous wastes, and hazardous constituents from RFETS into the environment.
31. The Management and Operating contractor prior to July 1975 was the Dow Chemical Company. Between July 1, 1975, and December 31, 1989, Rockwell was the Management and Operating

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contractor. Between January 1, 1990 and June 30, 1995, EG&G, Rocky Flats, Inc. was the Management and Operating contractor. On July 1, 1995, Kaiser-Hill Co., LLC, became the first Integrating Management Contractor for RFETS.

32. Consistent with section 3010 of RCRA, 42 U.S.C. § 6930, DOE and Rockwell notified EPA of hazardous waste activity at the Rocky Flats Plant on or about August 18, 1980. In this notification, DOE and Rockwell identified themselves as a generator of hazardous waste at the Rocky Flats Plant, and as a treatment, storage, and/or disposal facility. DOE and Rockwell also identified themselves as handling several hazardous wastes at the Rocky Flats Plant.

33. The Site was proposed for inclusion on the National Priorities List (NPL) on October 15, 1984, pursuant to section 105 of CERCLA, 42 U.S.C. § 9605. The listing became final September 21, 1989.

34. On November 1, 1985, DOE and Rockwell filed RCRA and CHWA Part A and B permit applications with both EPA and CDPHE, identifying certain generated hazardous waste streams and waste management processes.

35. On December 4, 1985, CDPHE issued a Notice of Intent to deny DOE's Part B permit application on the grounds of incompleteness.

36. On July 31, 1986, DOE, CDPHE, and EPA entered into a Compliance Agreement (1986 Compliance Agreement) which defined roles and established milestones for major environmental operations and response action investigations for the Site. The 1986 Compliance Agreement established requirements for compliance with CERCLA. Through this action, the 1986 Compliance Agreement established a specific strategy which allowed for management of high priority past disposal areas and low priority areas at the Site.

37. Pursuant to the 1986 Compliance Agreement, DOE identified approximately 178 individual hazardous substance sites and RCRA/CHWA regulated closure sites.

38. The 1986 Compliance Agreement also established roles and requirements for compliance with RCRA and CHWA through compliance with interim requirements and submittal of required permit applications and closure plans. The major TSD units previously identified which affected groundwater and soils include the Solar Evaporation Surface Impoundments, the Present Landfill, and Outside Storage Areas.

39. Through the 27 specific tasks identified in the five schedules included in the 1986 Compliance Agreement, DOE and Rockwell identified over 2000 waste generation points.

40. Remedial Investigations have indicated that elevated levels of hazardous substances including uranium, plutonium, and other metals of concern have been released into the environment. In addition, contamination from chlorinated hydrocarbons has been detected in groundwater, soils, and sediment at the Site. These materials have toxic effects, including possible carcinogenic, mutagenic, and/or teratogenic effects on humans and other life forms.

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41. The 1986 Compliance Agreement did not reflect the new requirements of SARA, including but not limited to the requirements governing federal facilities pursuant to section 120 of CERCLA. After the 1986 Compliance Agreement was issued, EPA's and CDPHE's priorities for investigation of the Site were clarified based on increased knowledge of the Site accrued from the ongoing investigation. The new priorities placed greater emphasis on those OUs that, based on information available, were known to pose the greatest risk to humans and the environment through actual or potential contact with wastes or contaminated soils, air, or water. EPA and CDPHE established criteria reflecting priorities for addressing both human health and environmental issues. This necessitated the revision of the Agreement in 1991.

42. In 1989, FBI and EPA agents executed a search warrant to confirm alleged violations of federal environmental laws and regulations at the Rocky Flats Plant. Following the search, the Department of Justice indicted Rockwell, the management and operating contractor at the time of the search, for commission of environmental crimes at the Rocky Flats Plant. In 1992, Rockwell's plea of guilty for environmental crimes was accepted in district court, and Rockwell consequently agreed to pay a fine of \$18.5 million.

43. In January 1991, DOE, EPA, and CDPHE signed the Rocky Flats Interagency Agreement (IAG). The IAG established a comprehensive plan for integrating environmental restoration activities at the Site through CERCLA and RCRA corrective action. The IAG divided the remedial activities into 16 OUs, with each OU designated either a State lead, EPA lead, or joint lead. The IAG also established a schedule including 221 milestones to guide and enforce activities related to these 16 OUs.

44. During 1992 and into 1993, it became apparent that unrealized schedule and cost assumptions would make it impossible for DOE to fully comply with the IAG schedules. DOE began missing milestones in March 1993, and a series of milestones was projected to be missed. As such, in early 1994, DOE proposed an agreement to toll the stipulated penalties associated with the milestones missed and projected to be missed over a certain period. According to the terms of the Tolling Agreement, signed by the Parties on July 7, 1994, DOE paid cash penalties to EPA and the State, and conducted Supplemental Environmental Projects, for a total value of \$2.8 million. The agreement tolled stipulated penalties until January 31, 1995. Subsequently, EPA and CDPHE agreed not to assess further stipulated penalties for violations of the IAG occurring after January 31, 1995.

45. On September 30, 1991, CDPHE issued a CHWA permit for a number of hazardous waste management units at RFETS. Since then, the permit has been modified a number of times to add additional units.

46. On October 6, 1992, the Federal Facility Compliance Act of 1992, Pub. L. No. 102-386 ("the FFC Act"), became law. This legislation amended the waiver of sovereign immunity found in RCRA section 6001 to extend that waiver to include civil and administrative penalties for violations of federal and State hazardous waste laws. The Act made explicit that the waiver extends to administrative orders and to all aspects of hazardous waste management. The Act also mandated that DOE develop mixed waste treatment plans for each of its facilities subject to certain waiver and exemption provisions as specified in the act, for approval by the appropriate regulatory authority (in the case of Rocky Flats, CDPHE is the appropriate

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regulatory authority). Unless exempted or waived, the mixed waste treatment plan requirement applies to those mixed wastes at RFETS which must be treated to meet RCRA section 3004(m). On October 3, 1995, DOE and CDPHE signed an Agreement and Order that complies with the FFC Act requirements.

47. In 1990, DOE informed the public and the regulators that an estimated 61 pounds of plutonium resided within the exhaust duct work of various production facilities at the Site.
48. In 1992, RFETS' mission changed from the production of nuclear weapons components to managing waste and materials, cleaning up and converting RFETS to beneficial use in a manner that is safe, environmentally and socially responsible, physically secure, and cost-effective.
49. A petition to list the Preble's Meadow Jumping Mouse (Zapus hudsonius preblei) as a threatened or endangered species was made to the U.S. Fish & Wildlife Service and the U.S. Department of the Interior by the Biodiversity Legal Foundation on August 9, 1994. The Preble's Meadow Jumping Mouse is thought to be one of the rarest small mammals in North America and is found in several of the riparian areas located within the RFETS Buffer Zone.

Subpart B. Conclusions of Law.

50. Based on the Findings of Fact set forth in Subpart A (Findings of Fact) and the information available as of the date of execution of this Agreement, EPA and CDPHE have determined the following:
 - a. DOE is a "person" as defined in section 101(21) of CERCLA, 42 U.S.C. § 9601(21).
 - b. The Site is a "facility" as defined in section 101(9) of CERCLA, 42 U.S.C. § 9601(9).
 - c. DOE is the "owner" of the Site within the meaning of section 101(20)(A) of CERCLA, 42 U.S.C. § 9601(20)(A).
 - d. Plutonium, carbon tetrachloride, trichloroethylene (TCE), tetrachloroethylene (PCE), and 1,1,1, trichloroethane (TCA), inter alia, are "hazardous substances" as defined by section 101(14) of CERCLA, 42 U.S.C. § 9601(14)(E). TCE, PCE and TCA are also hazardous constituents as defined by 6 CCR 1007-3, § 260.10.
 - e. Hazardous substances, including those described in the preceding paragraph, have been released into the environment at the Site as the term "release" is defined in section 101(22) of CERCLA, 42 U.S.C. § 9601(22).
 - f. The Site is subject to the requirements of CERCLA.
 - g. Pursuant to § 6001 of RCRA, 42 U.S.C. § 6961, DOE is subject to, and must comply with RCRA and CHWA.
 - h. DOE is a responsible party subject to liability pursuant to 42 U.S.C. § 9607 of CERCLA, with respect to present and past releases at the Site.

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- i. RFETS includes certain hazardous waste treatment, storage, and disposal units authorized to operate under section 3005(e) of RCRA, 42 U.S.C. § 6925(e), and section 25-15-303(3) of CHWA, and is subject to the permit requirements of section 3005 of RCRA, and section 25-15-303 of CHWA.
- j. Certain wastes and constituents at the Site are hazardous wastes or hazardous constituents as defined by section 1004(5) of RCRA, 42 U.S.C. § 6903(5), and 40 C.F.R., Part 261. There are also hazardous wastes or hazardous constituents at the Site within the meaning of section 25-15-101(9) of CHWA and 6 CCR 1007-3, Part 261.
- k. The Site constitutes a facility within the meaning of section 120 of CERCLA, 42 U.S.C. § 9620, sections 3004 and 3005 of RCRA, 42 U.S.C. §§ 6924 and 6925, and section 25-15-303 of CHWA.
- l. DOE is the owner and co-operator, and Kaiser-Hill Co., LLC, Rocky Mountain Remediation Services, Safe Sites of Colorado, Inc., and DynCorp of Colorado are co-operators, of the RFETS hazardous waste management facility within the meaning of RCRA and CHWA.
- m. There is, or has been, a release of hazardous waste and/or hazardous constituents into the environment from Solid Waste Management Units and disposal of hazardous waste within the meaning of section 3004(u) of RCRA, and CHWA.
- n. The submittals, actions, schedules, and other elements of work required or imposed by this Agreement are necessary to protect the public health, welfare, and the environment.

PART 7 CONSULTATION AND PROJECT COORDINATION

51. All Parties recognize that the successful implementation of this Agreement requires that each Party participate in the consultative process, as defined herein, in good faith. The Parties recognize that the consultative process represents a significant change from the manner in which the IAG was implemented. The Parties agree to utilize measures such as training programs, performance evaluation criteria, and Quality Action Teams to improve and ensure the success of the consultative process. The Parties also recognize that, as the Party responsible for project management, DOE bears a particular burden to initiate consultation with EPA and CDPHE to ensure the success of the consultative process.
52. "Consultation" and "the consultative process" mean the responsibility of one Party to meet and confer with another Party and any appropriate contractors in order to reach agreement among the Parties, to the extent possible, regarding a course of action. Consultation involves a cooperative approach to problem solving at the staff level. Consultation includes the responsibility to raise any concerns or suggestions regarding the implementation of this Agreement as soon as the concern or suggestion is identified. Consultation means timely participation at the staff or management level, as appropriate, to reach consensus among the regulators and DOE so that there is a clear understanding of the actions or direction to be taken based upon the outcome of the consultative process.

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53. Consultation, in relation to local elected officials, local government managers, RFLII, CAB, other groups and citizens, will include consideration of their advice and comments pertaining to key policy and strategic decisions such as land use, water quality, storage or disposal options, decontamination and decommissioning, soils remediation, facilities reuse, public safety, and infrastructure. These organizations and persons will be invited to participate early in the formulation of such policies and prioritization of RFETS activities. This consultative process is not intended to replace the public comment periods required by law, but will, instead, be in addition to them.

54. Consultation, in the context of developing a written document, means that the Parties and any appropriate contractors shall meet to discuss the expectations regarding the document from its initial planning stages, through serial drafts, and up to the completion of the final document. Consultation also includes meeting informally to resolve disagreements, as appropriate, before invoking the dispute resolution process.

55. On March 31, 1995, the Parties all agreed to follow a set of "Principles for Effective Dialogue and Communication at Rocky Flats." These principles are attached hereto as Appendix 2.

56. Within 30 days of the effective date of this Agreement, the Parties shall jointly finalize a plan for training all appropriate staff for the effective implementation of this Agreement. The plan will include:

- a. a description of how the training will be used to foster good faith constructive implementation of the RFCA;
- b. time frames for conducting training;
- c. different levels of training as appropriate to the job description;
- d. use of RFETS, EPA, CDPHE, or third party professional instructors;
- e. provisions for conducting needs assessments as necessary to determine the need for updating training materials and implementing new employee training; and
- f. involvement of RFCA negotiators from each Party to participate in training.

57. Within ten days of the effective date of this Agreement, each Party shall provide a written description to the other Parties of its internal organization, including identification of key individuals, to accomplish project coordination as described in the following paragraph. Each Party shall designate one or more individuals to perform the functions of the Project Coordinator described in this Agreement. Each Party shall also specify one or more points of contact responsible for sending, receiving, and distributing correspondence.

58. Changes to the information described in the preceding paragraph will be communicated by each Party in writing to the other Parties within ten days of such changes.

59. All Parties acknowledge that the need for project coordination is essential for the successful implementation of this Agreement. Project coordination includes, but is not limited to:

- a. consultation among individuals within a Party having subject matter expertise and/or regulatory/oversight responsibility;

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- b. in the event of internal disagreement about a proposal, internal resolution of the Party's position in a timely fashion;
- c. clear identification of individuals with authority to:
 - (1) make decisions regarding disputes at each level of dispute;
 - (2) responsibility for decision-making (decision hierarchy);
 - (3) authority, consistent with its agency's directives regarding contractual matters, to modify, redirect, or approve changes to work being performed pursuant to this Agreement when necessary to complete a project or achieve project acceleration or cost savings; and
- d. responsibility for ensuring that the consultative process is fully utilized, as necessary, to implement this Agreement. This includes encouraging and cultivating as much informal discussion at the staff level as possible.

60. Consistent with Part 30 (Classified and Confidential Information), EPA and CDPHE Project Coordinators (and, except for paragraphs (e) and (f), their designees) shall have the authority to, among other things:

- a. take samples and obtain duplicate, split or sub-samples of DOE samples;
- b. ensure that work is performed properly and pursuant to EPA and CDPHE protocols, standards, regulations, and guidance, as well as pursuant to the Attachments and approved decision documents and Work Description Documents incorporated into this Agreement;
- c. observe all activities performed pursuant to this Agreement (including the taking of photographs consistent with security restrictions), and make such other reports on the progress of the work as the Project Coordinator deems appropriate;
- d. review records, files, and documents relevant to this Agreement;
- e. in accordance with Part 10, Changes to Work, require field modifications to the work to be performed pursuant to this Agreement, or in techniques, procedures, or design utilized in carrying out this Agreement, which are necessary to the completion of the project; and
- f. set regulatory milestones in accordance with this Agreement.

61. In that portion of the Site in which each is the LRA, EPA and CDPHE have the authority to direct DOE to halt, conduct, or perform any tasks required by this Agreement when the LRA Project Coordinator determines that conditions may present an immediate risk to public health or welfare or the environment. If the LRA issues such verbal request, it shall follow up such request in writing within seven days.

PART 8 REGULATORY APPROACH

62. The following activities are regulated under this Agreement:

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- a. remedial activities for all IHSSs identified in Attachment 3;
- b. decommissioning in accordance with this Agreement and the MOU between the Parties and the DNFSB found in Appendix 1;
- c. compliance with 42 U.S.C. § 3969c(b)(5) requirements for mixed wastes generated by activities regulated under this Agreement that do not meet the treatment standards promulgated pursuant to 42 U.S.C. § 6924(m) and that are not proposed to be treated by treatment capacity developed pursuant to Compliance Order No. 95-10-03-01;
- d. timely completion of the milestones specified in Attachment 8; and
- e. closure of underground storage tanks in accordance with Attachment 13.

63. While this Agreement regulates only those activities identified above, the Parties recognize that many activities occurring on the site are related, and that efficient use of tax dollars demands that management and regulation of all site activities be integrated. The Parties will ensure integrated management and regulation of activities both within and outside the scope of this Agreement, in part through the annual budget planning process described in Part 11. Decisions made in the course of the annual budget planning process, particularly those related to temporal prioritization of activities, may result in proposed changes to activities required by other enforceable permits, orders, or agreements that are not subject to regulation under this Agreement. CDPHE agrees to coordinate its decisions regarding these other permits, orders, etc., with decisions made in the budget planning process in Part 11.

64. In making regulatory decisions regarding activities regulated by this Agreement, CDPHE and EPA agree that each shall apply the statutory and regulatory requirements and respective agency guidance or policy positions in effect at the time a decision is made.

65. Activities that are not subject to regulation under this Agreement shall continue to be subject to any existing permits, orders, etc., including, but not limited to, the following:

- a. CHWA permit No. CO7890010526
- b. Hazardous Materials and Waste Management Division Settlement Agreement and Compliance Order on Consent No. 93-04-23-01 (mixed residues order)
- c. Hazardous Materials and Waste Management Division Compliance Order No. 95-10-03-01 (Site Treatment Plan and Order pursuant to Federal Facility Compliance Act)
- d. air quality operating permit (when issued)
- e. NPDES permit No. CO-0001333

66. The Parties recognize that the activities regulated under this Agreement are subject to regulation under CERCLA, RCRA, and/or State environmental law, depending on the nature of the particular activity in question. Besides CHWA, the particular State environmental laws that may most frequently be applicable, depending on the activity, are the Colorado Air Pollution Prevention and Control Act, §§ 25-7-101, et seq., and the Colorado Petroleum Storage Tank Act, §§ 8-20.5-101, et seq. If Colorado receives delegation of the federal Clean Water Act program for RFETS, the Colorado Water Quality Control Act, § 25-8-101, C.R.S., may also be applicable to some cleanup actions. The activities that would be subject to the Colorado Petroleum Storage Tank Act are also subject to corrective action under CHWA. For those activities subject to both CHWA corrective action authority and the Petroleum Storage Tank Act, the State will defer taking remedial action under the Petroleum Storage Tank Act and will

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instead rely on corrective action authority, consistent with the approach described in Attachment 13. The Parties have agreed to the regulatory approach described in this Part to minimize the potential for duplicative regulation, while assuring that the legal requirements of each statute are met. Nothing in this paragraph shall be construed as an ARARs determination.

67. To implement this regulatory approach, the Parties have divided RFETS into "the Industrial Area" and the "Buffer Zone," as shown in Attachment 2. CDPHE will be the Lead Regulatory Agency (LRA) for all activities regulated under this Agreement in the Industrial Area, and EPA will be the Lead Regulatory Agency for all activities regulated under this Agreement in the Buffer Zone, as well as offsite. Conversely, CDPHE will be the Support Regulatory Agency (SRA) for activities regulated under this Agreement in the Buffer Zone and offsite, and EPA will be the Support Regulatory Agency for activities regulated under this Agreement in the Industrial Area. Notwithstanding the foregoing, CDPHE shall be the LRA regarding any facility for the retrievable, monitored storage or disposal of remediation wastes, regardless of whether such a facility is located in the Industrial Area or the Buffer Zone identified in Attachment 2.
68. Prior to the final CAD/ROD, remedial work in the Buffer Zone and offsite will be regulated by EPA as LRA pursuant to its CERCLA authority. Except as provided in the following three paragraphs, remedial work in the Industrial Area will be regulated by CDPHE as LRA pursuant to CHWA and other State environmental law that is applicable to the proposed activity, including, where appropriate, the Colorado Water Quality Control Act (if Colorado receives delegation of this program for RFETS), the Colorado Air Pollution Prevention and Control Act, and the Colorado Petroleum Storage Tank Act.
69. For purposes of implementing this Agreement, CDPHE shall carry out CERCLA authority to approve, disapprove, or modify and oversee portions of accelerated actions proposed for the Industrial Area that involve CERCLA hazardous substances that are not RCRA/CHWA hazardous constituents. CDPHE shall also carry out CERCLA authority to approve, disapprove, or modify and oversee proposed decommissioning activities in the Industrial Area. CDPHE shall also carry out authority to determine that activities or conditions in the Industrial Area constitute a release or substantial threat of release of hazardous substances to the environment. DOE may dispute those portions of State decisions regarding accelerated actions or decommissioning made under CERCLA as provided in Subpart 15B, except that if DOE appeals the SEC decision, such appeal shall be finally determined by the EPA Administrator instead of the Governor or his designee. DOE may dispute State determinations that conditions or activities in the Industrial Area constitute a release or substantial threat of release of hazardous substances to the environment in accordance with Subpart 15C, except that if DOE appeals the SEC decision, such appeal shall be finally determined by the EPA Administrator instead of the Governor or his designee. CDPHE agrees to follow EPA guidance in carrying out this CERCLA authority. This paragraph does not constitute any change to DOE's or EPA's status under CERCLA section 120(e) or Executive Order 12580, nor any limitation upon DOE's authority under the AEA.
70. Decommissioning activities shall be conducted as CERCLA removal actions, consistent with paragraph 96, the joint DOE-EPA May 22, 1995 policy regarding decommissioning of DOE facilities, and Attachment 9. Consistent with the approach described in this Part for regulating activities subject to this Agreement, CDPHE will regulate decommissioning activities in the Industrial Area under CERCLA, pursuant to the authority provided in the preceding paragraph.

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The Parties recognize that, at any given time, different parts of a given building may be in different stages of the operations/deactivation/decommissioning spectrum. The regulatory approach to decommissioning described in this paragraph shall be applied accordingly.

71. RFETS will be phasing out activities that generate hazardous and mixed wastes, and has or will be terminating the use and operation of processes and equipment that, because such equipment is no longer being used, may contain solid wastes that may be hazardous or mixed wastes. The Parties agree that the removal and management of hazardous and mixed wastes that are contained within shut down equipment is regulated under the CHWA and is not regulated under this Agreement. However, such activities will be prioritized and coordinated with activities regulated under this Agreement, in part through the budget review process in Part 11. Some residual hazardous, mixed and solid wastes (e.g., scale, minimal amounts of sludges, etc.) may remain in equipment after such initial removal of mixed, solid and hazardous waste inventories. The Parties agree that after such initial removal methods have been implemented, the final remediation of equipment containing residual hazardous or mixed wastes may be regulated by CDPHE as a decommissioning activity. If so, the residual wastes themselves shall be considered remediation wastes.

72. Except as provided in paragraphs 119 (Site-Wide documents) and 67, the LRA is responsible for primary review and sole approval of all decision documents and remedial work in the portion of the Site where it is the LRA. The SRA may review draft documents and provide comments on them to the LRA. However, the SRA shall defer exercising its own regulatory authority over activities regulated under this Agreement occurring in the portion of the Site where it is the SRA until the LRA has rendered a final remedial decision, as described in paragraphs 84 and 85. The Parties intend that, when acting as the SRA, EPA and CDPHE shall not be involved in the day-to-day oversight of activities regulated under this Agreement.

73. The Parties intend that, in exercising its own statutory authority, the LRA shall make remedial/corrective action decisions that protect human health and the environment in accord with its statutory requirements. The Parties also intend that the LRA's decisions should allow the SRA to determine that no further remedial action beyond what has already been required by the LRA is necessary to protect human health and the environment in accord with the statutory requirements of the SRA. To this end, the LRA shall consider the comments of the SRA when making decisions, but shall guard against the mechanical imposition of additive or duplicative requirements at each step of the process. The Parties expect this approach to satisfy the substantive requirements of CERCLA and applicable State environmental laws.

74. To ensure consistency between decisions made by EPA and CDPHE, the Parties have agreed on a number of issues that are contained in the Vision, Appendices or Attachments to this Agreement as follows:

- a. Assumptions regarding the future of RFETS, including land and water uses to be protected (the Preamble to this Agreement);
- b. initial risk ranking of Individual Hazardous Substance Sites (the "Environmental Restoration Ranking," Attachment 4), and a process for updating and revising this ranking;
- c. An Action Levels and Standards Framework, including action levels for contaminated soils and groundwater, and action levels and standards for surface water (Attachment 5);

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- d. criteria for deciding when no further remedial action is required (Attachment 6); and
- e. Building and equipment disposition standards (Attachment 9).

75. The Action Levels and Standards Framework, Attachment 5, establishes action levels for ground water and soil as well as action levels and cleanup standards for surface water. Attachment 5 also establishes a deadline for setting additional action levels for soil and interim cleanup levels for soil. Action levels and standards are requirements of this Agreement, but exceedance of an Action Level is not subject to penalties. The Framework action levels describe numeric levels of contamination in ground water, surface water, and soils which, when exceeded, trigger an evaluation, remedial action and/or management action. The Framework surface water standards are in-stream contaminant levels that, contingent on action by the Colorado Water Quality Control Commission to align stream classifications and standards with the Action Levels and Standards Framework, the regulators will require DOE to meet for activities undertaken prior to the final CAD/ROD, and which constitute the Parties' current joint recommendation for the CAD/ROD. (If the Colorado Water Quality Control Commission does not modify the existing stream standards, the Action Level Framework will be modified accordingly.) In-stream concentrations that exceed the Framework action levels at points of evaluation identified in the Framework will trigger the need for DOE to perform an evaluation and/or mitigating action. It is the Parties' intention to develop an Integrated Water Management Plan that assures the Framework standards for radionuclides and non-radionuclides will not be exceeded at the points of compliance. Nevertheless, in-stream concentrations that exceed the Framework standards at points of compliance identified in the Framework will trigger mitigating action by DOE and penalty liability in accordance with paragraph 219. If mitigating action becomes necessary, DOE will obtain approval for such activities through the appropriate decision document and will incorporate such activities in the baseline.

76. The Parties intend DOE to develop, and the regulators to approve, decision documents that incorporate the Framework cleanup standards and action levels. While the Parties recognize that it would be premature for EPA to make an ARARs determination at this time, the Parties expect that the Action Level Framework action levels and cleanup standards will inform EPA's ultimate decision. Similarly, the Parties recognize that the Framework cleanup standards are not State water quality standards, which only the Colorado Water Quality Control Commission has the authority to establish, although most are consistent with such standards. The Parties have agreed to involve affected downstream water users in developing the Integrated Water Management Plan, and in coordinating petitions to the Colorado Water Quality Control Commission for changes to water quality standards, including for temporary modifications (see Appendix 5).

77. The Parties recognize that compliance with surface water cleanup standards at RFETS has implications associated with storm water management, pond operations, and public safety because of the need to maintain the integrity of the dams at RFETS. The Parties anticipate that, in the event of a dam breach or failure, there may be elevated levels of contaminants released into the surface waters at RFETS. The Parties, therefore, agree that management of the RFETS ponds to prevent a dam breach or failure may be necessary to assure dam safety.

78. The Parties have also agreed to develop a set of guidelines for reviewing documents and proposed work that will allow DOE to use the same basic approach regardless of whether a proposed document or proposed work relates to the Industrial Area or the Buffer Zone. These

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guidelines will be contained in the IGD, in Appendix 3. While these guidelines are not binding on DOE, CDPHE and EPA will use them in reviewing the adequacy of documents submitted and work proposed by DOE.

79. To expedite remedial work and maximize early risk reduction at the Site, the Parties intend to make extensive use of accelerated actions to remove, stabilize, and/or contain Individual Hazardous Substance Sites (IHSSs). Focussing on IHSSs rather than OUs will allow most remedial work to be reviewed and conducted through one of the accelerated review and approval processes described in Part 9, rather than the RI/FS process. The Parties have agreed upon a risk ranking of the IHSSs, which is contained in Attachment 4. The ranking of IHSSs will be reviewed annually, and may be revised as appropriate. The Parties will consider the risk ranking and other factors to prioritize work for the baseline, in accordance with Part 11 (Budget and Work Planning).

80. The Parties recognize that the facility described in this paragraph providing for retrievable, monitored storage of remediation wastes may be converted at a future date to a disposal facility. The Parties also recognize that some remedial actions (e.g., in-place closures) may incorporate disposal as an initial proposal. The Parties anticipate that consistent with the Preamble Objectives, retrievable, monitored storage of remediation wastes (except for TRU or TRU mixed wastes), with an option for conversion to disposal in-place in accordance with future decision-making, may be accomplished through use of a Corrective Action Management Unit (CAMU). The Parties agree that the design criteria for the facility described in this paragraph shall be the same whether the facility is for the retrievable, monitored storage of remediation wastes or for the disposal of remediation wastes. Specifically, the facility described in this paragraph must ensure retrievability of wastes and protection of human health and the environment through a combination of requirements that include, but are not limited to: detection and monitoring/inspection requirements; operating and design requirements, including cap/liner system that meets the requirements as set forth in 6 CCR § 1007-3, Part 264, Subpart N; a ground water monitoring system; and requirements for responding to releases of wastes or constituents from the units. In addition, where necessary for protection of human health and environment, waste treatment will be required. If DOE proposes a CAMU, it is the expectation of the Parties that if the application meets the appropriate substantive criteria, CDPHE will issue a CAMU designation for storage or disposal in a timely fashion, consistent with its general commitment to expedite regulatory approval of those activities required to achieve the Preamble Objectives. If DOE proposes a storage CAMU, it may request that CDPHE make findings of fact as to whether the proposed facility also meets the requirements for a disposal CAMU that are in effect at the time of the request. CDPHE agrees to make such findings upon request. The Parties also agree that a CAMU for remediation wastes and another RCRA/CHWA Subtitle C unit for storage or disposal of process wastes (except TRU and TRU mixed wastes) not regulated under this Agreement may be co-located. The review, approval and oversight of any unit for process wastes is also not regulated under this Agreement, but by CDPHE under the existing CHWA permit, as set forth in Appendix 8.

81. For purposes of this Agreement, wastes generated by activities regulated under this Agreement are remediation wastes. All such wastes, except for TRU and TRU mixed wastes, are suitable for storage or disposal in an approved on-site CAMU, in accordance with the terms of any such approval.

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82. Any proposal for a centralized facility at RFETS for the retrievable, monitored storage or disposal of remediation wastes shall be subject to approval only by CDPHE as the LRA, regardless of its location. Notwithstanding any other provision of this Agreement regarding the role of the SRA, EPA may participate fully in the review and consultative processes related to such a facility. In addition, EPA shall have the right to invoke the dispute resolution provisions of Part 15E regarding any CDPHE decision related to such a facility, within 15 days of the issuance of any such decision.
83. Following implementation of all planned accelerated actions, CDPHE and EPA shall evaluate the Site conditions and render final remedial/corrective action decisions for each OU. Notwithstanding the emphasis on accelerated actions and IHSS-based approach, the Parties recognize that the final remedial/corrective action decisions may require some additional work as specified in the CAD/ROD to ensure an adequate remedy.
84. Following implementation of all planned accelerated actions, for the Industrial Area OU, CDPHE will make a final corrective action decision for hazardous constituents pursuant to its CHWA regulatory authority, and DOE, consistent with its authority under CERCLA § 120, shall make a proposed remedial decision under CERCLA. CDPHE shall make a recommendation to EPA whether to concur with DOE's proposed remedial decision for radionuclides and other hazardous substances that are not hazardous constituents. EPA, consistent with CERCLA § 120, shall review DOE's proposed remedial decision and CDPHE's recommendation thereon, and shall then concur or non-concur with DOE's proposed remedy. EPA's decision regarding radionuclides and other hazardous substances that are not hazardous constituents shall incorporate CDPHE's recommendation, so long as EPA determines that the recommendation is consistent with CERCLA. EPA and DOE, consistent with CERCLA § 120, shall also review CDPHE's corrective action decision and shall issue a concurrence remedial action decision under CERCLA, so long as CDPHE's selected corrective action decision is consistent with CERCLA.
85. Following implementation of all planned accelerated actions, for those OUs in the Buffer Zone or offsite, EPA and DOE, consistent with CERCLA § 120, will make a final remedial decision pursuant to CERCLA. CDPHE shall review the final remedial decision and shall issue a concurrence corrective action decision under CHWA, so long as the final remedial action is consistent with CHWA and applicable State law.

PART 9 REVIEW AND APPROVAL OF DOCUMENTS AND WORK

Subpart A. General

86. The provisions of this Part establish the procedures that shall be used by the Parties to provide each other with appropriate notice, review, comment, and responses to comments regarding submitted documents. As of the effective date of this Agreement, all documents identified herein shall be prepared, distributed, reviewed, approved or disapproved, and subject to dispute resolution in accordance with this Part. The Parties shall implement the provisions of this Part in consultation with each other. Schedules for submittal of documents are contained in the baseline in Appendix 4. Procedures in this Part for the review and approval of CAD/RODs shall not alter, but shall supplement the procedures set forth in paragraphs 83 and 84.

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87. DOE shall notify the designated Natural Resource Trustees, local elected officials, and the Citizens Advisory Board (CAB) of the issuance of any documents, the deadlines for submitting comments thereon, and a notation that comments submitted after the specified deadlines may not be considered. Upon request, DOE shall provide each Natural Resource Trustee and the CAB with a copy of any document. DOE shall place a copy of any document in the Repositories at the same time it forwards the document to CDPHE and EPA. If any of the State Natural Resource Trustees elect to comment on any documents, CDPHE will forward their comments to DOE and EPA. Federal Natural Resource Trustees and the CAB will forward their comments directly to DOE, EPA and CDPHE.

88. Except as provided in paragraph 119, the LRA shall be responsible for review and approval of all decision documents received pursuant to this Agreement. When drafting comments, the LRA shall consider the Parties' expectation that both regulators should endorse the same final remedial decision. The LRA shall rely on the IGD as the primary guidance in evaluating the adequacy of submitted documents.

89. The appropriate Project Coordinators from each Party shall meet monthly, except as otherwise agreed, to review and jointly evaluate the progress of work being performed on the documents and implementation thereof. The appropriate representatives shall discuss a document in an effort to reach a common understanding of expected content and purpose prior to preparing the draft document, during the LRA's review of the submitted document, and during DOE's preparation of the final document. During such discussions, the LRA and DOE Project Coordinators will agree on the estimated review time for the document, which the Parties agree to minimize, consistent with the LRA's statutory responsibilities. If the Parties cannot agree on a review time, the LRA shall select the review time consistent with the standard described in the preceding sentence. In addition, staff level discussions shall be conducted throughout the document preparation and review process to avoid major revisions to draft documents.

90. Representatives of each Party shall make themselves readily available during the review and comment period for consultation and comments on documents. Oral comments made during such discussions need not be the subject of a written response by the DOE at the close of the review and comment period.

91. When submittal of a document is defined as a regulatory milestone, compliance with the regulatory milestone is defined as DOE's submittal, by the date specified in Attachment 8, of a document that is approved by the appropriate LRA. Documents disapproved shall not be defined as compliant with the regulatory milestones. If the draft document is disapproved and subsequently revised and approved prior to the defined regulatory milestone, then this shall be deemed compliant with the regulatory milestone.

92. Comments which significantly expand previously approved workscope may be considered good cause for regulatory milestone modifications. In that case, DOE shall formally notify the LRA within 30 days of receipt of comments and request appropriate changes to the affected milestones.

93. Documents subject to this Part and listed in paragraphs 118 and 119 shall be designated as decision documents. Such documents may or may not have an associated regulatory milestone.

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DOE may not invoke dispute resolution regarding comments submitted on draft decision documents. It may only invoke dispute resolution for decisions to disapprove the proposed final decision documents. All other non-decision documents, such as those listed in paragraph 121, are not subject to the review and approval provisions of this Part. Non-decision documents include input or feeder documents to a decision document, documents that act as discrete portions of decision documents, and certain program-wide support and guidance documents. These documents do not have regulatory milestones associated with them; however, DOE recognizes that their submittal in a timely manner facilitates meeting regulatory milestones and ensuring expeditious cleanup of the Site. Through the consultative process, DOE will keep the regulators informed regarding the content of these documents and will endeavor to incorporate all of the comments made by the regulators to avoid subsequent conflict, disapprovals or the issuance of stop work orders. DOE's failure to resolve the regulator's concerns, as expressed in its comments on a non-decision document, may result in subsequent disapproval of a related decision document.

94. DOE shall complete and transmit documents listed in this Part in accordance with the baseline in Appendix 4. Following receipt of comments on the draft document, DOE shall complete and transmit the proposed final documents in accordance with the baseline.

95. In accord with the June 1994 DOE Secretarial Policy on NEPA issues, decision documents prepared by DOE for activities required under this Agreement are to incorporate NEPA values, to the extent practicable. Therefore, separate NEPA reviews will not ordinarily be required for such activities. However, DOE may choose, after consultation with stakeholders, or as a matter of policy, to conduct separate NEPA reviews for a proposed action, for example, the siting, construction, and operation of treatment, storage or disposal facilities that, in addition to supporting an action required under this Agreement, also serve waste management or other purposes. DOE may also perform NEPA reviews for proposed actions not regulated under this Agreement but which may affect activities conducted under this Agreement.

Subpart B. Document and Work Review and Approval Processes

96. All remedial work at the Site, including all non-time-critical removal actions, shall be conducted either as an accelerated action for one or more IHSSs, a closure plan, or pursuant to a CAD/ROD for an OU. All remedial work shall be implemented considering the factors described in paragraph 145 (Budget and Work Planning). DOE shall not commence any activity subject to approval under this Part unless it has been approved by CDPHE or EPA or, in the case of a disapproval, until the dispute resolution process has been exhausted. Notwithstanding the above, DOE may initiate a time-critical removal action if it determines, in accordance with the NCP, that an immediate response is needed to eliminate or abate a release or substantial threat of release of a hazardous substance posing an immediate and substantial endangerment to public health and welfare or the environment. DOE shall notify EPA and CDPHE within 24 hours of this determination. Once the immediate threat has been averted or mitigated, DOE shall propose any further actions that may be necessary in accordance with the provisions of this Part or Part 10, as appropriate. DOE recognizes that if it proceeds with work that has been disapproved, it may be subjected to enforcement action by CDPHE or EPA. There are three types of accelerated actions:

- a. Interim Measure/Interim Remedial Action (IM/IRA)
- b. Proposed Action Memorandum (PAM)
- c. RFCA Standard Operating Protocol (RSOP)

IM/IRAs apply to accelerated actions that are estimated to take more than six months from the time of commencement of physical remedial work to complete. PAMs apply to accelerated actions that are estimated to take less than six months from time of commencement of physical

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remedial work to complete. RSOPs apply to accelerated actions that are routine and substantially similar in nature, for which standardized procedures can be developed. RSOPs may incorporate "Alternative Operating Scenarios" as provided in the Air Quality Control Commission's regulations to implement CAPPACA requirements in lieu of individual construction permits from the Air Pollution Control Division. Closure Plans apply to regulated hazardous waste management units. CAD/RODs apply to the final corrective/remedial decision made for an OU following implementation of all accelerated actions.

97. Closure of permitted or interim status units may be performed either pursuant to a separate closure plan or an accelerated action decision document. Closure Plans shall follow the relevant review process described in 6 CCR 1007-3, Parts 264 or 265 and/or Part 100 for the hazardous waste unit(s) in question. When a decision document incorporates a modification to an approved closure plan for a permitted unit, CDPHE shall modify the permit to incorporate the approved closure plan modification. The requirements for closure of interim status units that are regulated under this Agreement are set forth in Attachment 10. Compliance with applicable CHWA closure requirements when the closure is performed as an accelerated action, including any requirements for post-closure permits, will be addressed in the PAM, RSOP or IM/TRA.

98. IM/TRAs, CAD/RODs, and PAMs approved prior to the effective date of this Agreement shall be implemented as requirements of this Agreement. Accelerated actions, including those that are in lieu of closure plans, do not require separate CHWA permit modifications or permits. Instead, CHWA requirements that are applicable to the proposed action, including any requirements for post-closure permits, will be in the PAM, IM/TRA, or RSOP.

If an accelerated action in the Industrial Area would trigger the requirement for a permit described in paragraph 103.a or 103.b, CDPHE commits that the procedural requirements for obtaining such permit shall not result in any additional time for approval of that activity than would otherwise be required under this Agreement.

100. To further streamline the work approval process, CDPHE agrees that DOE may apply for a single construction permit that could cover multiple activities which would otherwise require air construction permits. Such a permit application could incorporate "Alternative Operating Scenarios" in accord with state air quality regulations. Such permit application may, but need not, be made in conjunction with a specific proposed accelerated action. In such an application, DOE may develop a "worst case scenario" that projects emissions levels, numbers and types of pollutants, volumes of soil to be excavated that would constitute an upper bound defining the largest excavation project anticipated, and equipment needs. Once approved, DOE would not need additional air quality construction permits for subsequent activities that fall within the limits established in the alternative operating scenario.

101. The Parties recognize that, in the Industrial Area OU, activities regulated under this Agreement will require the coordination of activities between a number of State environmental agencies or departments, whether or not separate permits are required. CDPHE agrees, absent circumstances beyond its control, to provide adequate coordination of, and timely response from, its various agencies and other State departments. CDPHE also agrees to provide DOE with guidance so that DOE can submit a single draft document that meets both the information requirements of applicable permits and the information needed for CDPHE to make a

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determination under CHWA. All State-imposed conditions on the proposed action shall be contained in the PAM, IM/TRA, consolidated review process decision, or CAD/ROD.

102. CDPHE shall determine in the scoping phase of any proposed action in the Industrial Area whether a State permit will likely be required, consistent with the following two paragraphs. If, during the scoping phase of a proposed action, DOE provides CDPHE with adequate information to determine that a permit is required, but CDPHE fails to identify the need for a State permit until after the scoping phase of a proposed action, the appropriate review process described in one of the following two paragraphs shall still be followed. However, DOE shall be entitled to an extension of any affected regulatory milestone, and CDPHE shall, absent circumstances beyond its control, mitigate any delay from the failure to identify the need for the permit. If CDPHE fails to identify the need for a permit during the scoping phase due to DOE's failure to provide the necessary information, the appropriate review process described in one of the following two paragraphs shall still be followed. CDPHE shall still use its best efforts to mitigate any delay from the failure to identify the need for a permit, but DOE shall not be entitled to an automatic extension of any affected regulatory milestone.

103. If, during the scoping phase for any accelerated action proposed to be implemented in the Industrial Area, CDPHE determines that the proposed action will likely require either:

- a. a minor source construction permit from the Air Pollution Control Division (APCD) or a minor modification to a construction permit from the APCD that does not trigger any major source requirements under the Prevention of Significant Deterioration program of Part C of the Federal Clean Air Act (see § 25-7-201, C.R.S.) or major non-attainment permit requirements under Part D of the Federal Clean Air Act (see § 25-7-301, C.R.S.); or modification of any operating permit from the APCD that is not a significant permit modification under Regulation 3 of the Colorado Air Quality Control Commission; and/or
- b. following delegation of the federal program to the State for RFETS, a discharge permit from the Water Quality Control Division,

the consolidated review process described in the following paragraph shall be used.

104. Following scoping, during which CDPHE shall work with DOE to ensure the adequacy and completeness of DOE's submittal of the relevant draft permit application/document (e.g., draft IM/TRA, PAM, or RSOP), CDPHE shall issue a draft permit decision for public comment. The public comment period for the permit decision shall run for the same period of time as the public comment period for the decision document, and the two documents shall be packaged together. Following the public comment period, CDPHE shall issue a decision on the accelerated action and the necessary State environmental permits, if any. This decision shall be subject to dispute resolution by DOE under Part 15B. The final resolution of any dispute shall constitute approval or disapproval of the action under the CHWA and of the relevant permit decision under the CAPPKA, and may be appealed in accordance with applicable law.

105. If, during the scoping phase for any accelerated action proposed to be implemented in the Industrial Area, CDPHE determines that the proposed action will likely require a permit or modification to a permit from the APCD other than those described in the preceding

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subparagraph 103.a, DOE shall follow the appropriate substantive and procedural requirements of the Colorado Air Quality Control Commission in complying with the CAPPCA.

106. Remedial activities that are planned to be accomplished in less than six months may be approved under the PAM process described in this paragraph, unless CDPHE determines that an environmental permit would be required, as described in paragraphs 103 and 105. Such remedial activities may be identified through the annual budget and work planning process, or they may be identified during the fiscal year. Upon agreement of the LRA that such an action is necessary, DOE shall prepare a draft PAM in consultation with the LRA. The draft PAM shall contain a brief summary of data for the site; a description of the proposed action; an explanation of how waste management considerations will be addressed; an explanation of how the proposed action relates to any long-term remedial action objectives; proposed performance standards; all ARARs and action levels related to the proposed action; and an implementation schedule and completion date for the proposed action. DOE will issue the draft PAM to the LRA for its review and simultaneously make it available for a thirty-day public comment period, unless a longer period is required consistent with the LRA's statutory authorities. Within two weeks of the close of the public comment period, DOE shall incorporate public comments, as appropriate, prepare a response to comments, and submit both the revised PAM and response to comments to the LRA. The LRA shall have seven calendar days to approve or disapprove the revised PAM and response to comments, but it may extend this period by an additional seven calendar days, based on good cause communicated to DOE in a timely fashion. If the LRA disapproves the revised PAM, it shall state the changes that DOE must make to receive approval. DOE shall then have 14 days to incorporate the LRA's changes or invoke dispute resolution. If the LRA does not approve or disapprove the revised PAM within seven days (or 14 days, if it extends the time for a decision), the revised PAM is deemed approved as submitted.

107. Remedial activities that are planned to take more than six months may be approved under the IM/IRA process described in this paragraph, unless CDPHE determines that an environmental permit would be required, as described above, or unless the activity constitutes a Class 3 permit modification, in which case the Parties will follow the procedure set out in the next paragraph. Such remedial activities may be identified through the annual budget and work planning process, or they may be identified during the fiscal year. Upon agreement of the LRA that such an action is necessary, DOE shall prepare a draft IM/IRA in consultation with the LRA. The draft IM/IRA shall contain a brief summary of data for the site, a description of the proposed action, an explanation of how waste management considerations will be addressed, an explanation of how the proposed action relates to any long-term remedial action objectives, proposed performance standards, all ARARs and action levels related to the proposed action; and an implementation schedule and completion date for the proposed action. As part of the scoping process described in paragraph 89, DOE will provide the draft IM/IRA to the LRA 14 days before issuing it for the agency review and public comment described in this paragraph. DOE will issue the draft IM/IRA to the LRA for its review and simultaneously make it available for a public comment period that shall last no less than 45 and no more than 60 days. Within the time frame determined during the scoping process described in paragraph 89, DOE shall incorporate public comments, as appropriate, prepare a response to comments, and submit both the revised IM/IRA and response to comments to the LRA. The LRA shall approve or disapprove the revised IM/IRA and response to comments within the time period set during the

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scoping process described in paragraph 89, unless the LRA extends this period based on good cause communicated to DOE in a timely fashion. If the LRA disapproves the revised IM/TRA, it shall state the changes that DOE would have to make to receive approval. DOE shall then have 21 days to incorporate the LRA's changes or invoke dispute resolution. If the LRA does not approve or disapprove the revised IM/TRA within the time allotted (including any extension of time), any milestone associated with the IM/TRA shall be suspended and will be re-established as agreed by the Parties. If the Parties cannot agree, EPA and CDPHE shall unilaterally re-establish the milestone. A unilaterally re-established milestone shall be extended by a period no less than the excess time taken by the LRA to render the IM/TRA decision.

108. If there is an activity that DOE expects to undertake in the Industrial Area which is an activity listed as requiring a Class 3 permit modification pursuant to CHWA regulations, and for which no permit by rule would be available, DOE shall--prior to submitting the draft IM/TRA to CDPHE, but after the scoping period--make the draft IM/TRA available for a 60 day public comment period. DOE shall transmit all comments to CDPHE for its subsequent review. CDPHE shall use its best efforts to issue its draft decision, including applicable requirements, and other information as required by current regulation within 30 days of receipt of the draft IM/TRA and public comments. This draft decision shall itself be made available for public comment for 60 days, with an opportunity for public hearing. Within 30 days of the close of the public comment period, CDPHE shall revise its proposed decision accordingly and respond to significant public comment. If CDPHE denies DOE the authority to proceed with the activity or imposes conditions thereon with which DOE disagrees, DOE may invoke dispute resolution.

109. Since the beginning of FY 1996, DOE has engaged members of the public in an on-going conversation, including a dozen meetings and work sessions, regarding whether and how to construct a storage or disposal facility for remediation wastes at RFETS. As a result of this interaction, DOE's ideas about the design and purposes of such a facility have evolved. DOE anticipates that it will be applying during 1996 for designation of a storage CAMU. The Parties commit to a meeting with the public to discuss the CAMU application prior to its submission.

a. When DOE determines that it is prepared to seek designation of a CAMU for storage of remediation wastes, DOE shall submit a draft IM/TRA to EPA and CDPHE which satisfies applicable regulatory criteria for designation and the criteria described in paragraph 80, and presents an analysis of alternatives showing that DOE has considered the following:

- (1) worker safety,
- (2) protection of public health and the environment,
- (3) transportation,
- (4) facility design, containment and monitoring,
- (5) institutional controls,
- (6) cost, and
- (7) community acceptance.

The Parties recognize the special expertise of CDPHE with respect to the design of hazardous waste storage and disposal facilities. Therefore, with respect to DOE's obligation to incorporate NEPA values into any decision document associated with the

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1 designation of a CAMU at RFETS, CDPHE will be designated by DOE as a cooperating
2 agency to assist DOE in the analysis of reasonable alternatives, including the "No Action"
3 alternative. As a cooperating agency, CDPHE's participation will be sought by DOE early
4 in the alternatives analysis process to ensure CDPHE's special expertise is available to
5 DOE as it incorporates relevant NEPA values into any decision document associated with
6 the designation of a CAMU.
7

- 8 b. Within 45 days of receipt of DOE's draft IM/TRA, CDPHE shall determine that the
9 IM/TRA meets or fails to meet the criteria in subparagraph (a). If CDPHE determines that
10 the draft fails to meet the criteria, it shall, at the end of its 45 day review, explain with
11 specificity the necessary modifications and allow DOE to resubmit within 30 days or to
12 invoke dispute resolution within 14 days. If CDPHE determines that the application meets
13 the criteria described in subparagraph (a), it shall issue the draft IM/TRA for public
14 comment for a period of 60 days.
15
- 16 c. Within 30 days of the close of the public comment period, CDPHE shall review the
17 comments received and modify the draft if appropriate. The agency shall also prepare a
18 response to significant public comments during this time. At the end of this 30 day
19 period, if CDPHE still agrees that the IM/TRA as modified meets the regulatory criteria
20 for designation and the criteria in paragraph 80, CDPHE shall designate the storage
21 CAMU. If CDPHE has determined that the IM/TRA does not meet these same criteria,
22 it shall state the changes that DOE must make to receive approval.
23
- 24 d. Time is of the essence regarding a final decision on a storage CAMU for remediation
25 wastes. CDPHE recognizes this, and has therefore committed to the review times set forth
26 in this paragraph. CDPHE's failure to meet these time frames does not result in approval
27 of the proposed document.
28

29 110. If DOE determines, after a process of public consultation that shall occur in accord with the
30 Community Relations Plan, and after consideration of:

- 31 a. protection of public health and the environment;
32 b. worker safety;
33 c. transportation;
34 d. facility design, containment and monitoring;
35 e. institutional controls;
36 f. cost; and
37 g. community acceptance
38

39 that it intends to proceed with either (i) building a new on-site disposal facility for remediation
40 waste, or (ii) converting or upgrading an existing unit at Rocky Flats into a disposal facility for
41 remediation wastes, DOE shall apply to CDPHE in accord with then-applicable law. The
42 application shall describe the types of wastes that would be disposed, the location of the facility
43 and its design, along with other information as specified in the IGD; include an analysis of
44 alternatives; and demonstrate that the facility would meet then-applicable legal requirements.
45

46 This application shall be processed either as an accelerated action pursuant to the process
47 established in RFCA paragraphs 89, 107 and 108, or as part of the CAD/ROD, whichever is

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appropriate at the time, as well as in a manner that is consistent with then-applicable requirements.

111. DOE shall submit appropriate Air Pollution Emission Notices as part of the draft decision document for all work, regardless of whether it is to be performed in the Industrial Area or the Buffer Zone. This information shall be available for inspection at RFETS.
112. In responding to draft decision documents that are not Site-Wide documents, the LRA shall obtain comments from and, where appropriate, consult with the SRA. Following such consultation with the SRA (if any) the LRA shall submit a single set of consistent, consolidated comments to DOE on or before the close of the comment period. The LRA agrees to use its best efforts to provide a comprehensive set of comments on draft documents to DOE so as to avoid, to the extent possible, raising issues of first impression at a later stage. Comments shall be provided with adequate specificity so that DOE may respond to the comments and, if appropriate, make changes to draft documents. If the LRA takes more time than allotted pursuant to paragraph 89 to respond to a draft decision document, such a delay may constitute good cause for regulatory milestone modifications.
113. For Site-Wide documents, EPA and CDPHE shall attempt to reach concurrence and provide DOE with a single set of consistent, consolidated comments to DOE on or before the close of the comment period. EPA and CDPHE agree to use their best efforts to provide a comprehensive set of comments on draft documents to DOE so as to avoid, to the extent possible, raising issues of first impression at a later stage. Comments shall be provided with adequate specificity so that DOE may respond to the comments and, if appropriate, make changes to draft documents. If the regulators take more time than allotted pursuant to paragraph 89 to respond to a draft decision document, such delay may constitute good cause for regulatory milestone modifications.
114. Following the close of the review and comment period for a draft decision document (including any public comment), DOE shall prepare a proposed final decision document. In so doing, it shall give full consideration to all written comments submitted by the LRA (or, in the case of Site-Wide documents, EPA and CDPHE). DOE shall seek clarification of the intent and purpose of any comment from the LRA (or, in the case of Site-Wide documents, EPA and CDPHE) that DOE finds is unclear before preparing the proposed final decision document.
115. The LRA (or, in the case of Site-Wide documents, EPA and CDPHE) shall review the proposed final decision document and shall approve or disapprove it. If the proposed final decision document is approved, that document shall become final. If the LRA disapproves a document, it must explain the necessary modifications or reasons for disapproval and delineate the actions that must be taken for approval. If the proposed final decision document is disapproved, DOE shall revise and re-submit those portions of the document that require revision in compliance with the notice of disapproval, unless DOE invokes dispute resolution pursuant to Subpart 15B or 15E, as appropriate, within the period allowed for re-submittal. When dispute resolution is invoked on a proposed final document, work may be stopped in accordance with the procedures set forth in Part 14.

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1 116. The following documents have already been approved. Complete references to these documents
are contained in Attachment 12. These documents are located in the public repositories specified
in Attachment 7, and are incorporated by reference into this Agreement:

- 4 a. Quality Assurance Plan
- 5 b. Historical Release Report (HRR)
- 6 c. Existing ER Standard Operating Procedures
- 7 d. Community Relations Plan (CRP)
- 8 e. Treatability Study Workplan
- 9 f. Health and Safety Plan
- 10 g. Plan for Prevention of Contaminant Dispersion
- 11 h. Background Geochemical Characterization Report
- 12 i. previously approved PAMs, IM/IRAs, and CAD/RODs listed in Attachment 12

4
5 117. The Attachments to this Agreement listed below may be modified through the process described
6 in paragraphs 89, 113, 114 and 115.

- 7 a. OU Consolidation Plan
- 8 b. Environmental Restoration Ranking
- 9 c. Action Levels and Standards Framework
- 0 d. Building and Equipment Disposition Standards
- 1 e. Criteria for No Action/No Further Action/No Further Remedial Action Decisions
- 2 f. RCRA Closure for Interim Status Units

3
4
5 Modification of Attachments listed above in (c)-(f) are subject to public review and comment.

6
7 118. The following decision documents are subject to the review and approval of the appropriate LRA
as provided in this Part. DOE shall complete and transmit these documents as described in the
baseline, or in accordance with a regulatory milestone.

- 8 a. RFI/RI Work Description Documents
- 9 b. RFI/RI Reports
- 0 c. CMS/FS Reports
- 1 d. IM/IRA Decision Documents
- 2 e. Closure Plans
- 3 f. Corrective/Remedial Design Plans
- 4 g. Corrective/Remedial Design Work Description Documents
- 5 h. Sampling and Analysis Plans
- 6 i. IM/IRA Implementation Documents
- 7 j. Closeout Reports
- 8 k. PAMs
- 9 l. Decommissioning Operations Plans for major facilities, such as Buildings 371, 771,
776/777, 707 and 991
- 0 m. Future RSOPs for activities regulated under this Agreement that are likely to occur in only
one OU
- 1 n. Treatability study reports for activities related to one OU

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119. The following Site-Wide documents are subject to the review and approval of CDPHE and EPA. DOE shall complete and transmit the following Site-Wide documents as described in the baseline, when a modification of the documents is proposed, or in accordance with a regulatory milestone:

- a. the IGD and any updates thereto
- b. CADs/RODs
- c. Draft Permit Modifications for CADs/Proposed Plans
- d. Updates to the CRP
- e. Future Standard Operating Procedures for activities covered by this Agreement that are likely to occur in more than one OU
- f. Treatability Study Reports for activities that are related to more than one OU
- g. Integrated Monitoring Plan
- h. Updates to the Environmental Restoration Ranking
- i. Integrated Water Management Plan
- j. decision documents proposing treatment for remediation wastes from both the Industrial Area and the Buffer Zone
- k. Decommissioning Program Plan
- l. annual updates to the HRR

120. DOE shall complete and transmit the following non-decision documents in accordance with the baseline for the LRA's (or, in the case of Site-Wide documents, both EPA's and CDPHE's) review and comment. Technical memoranda and other non-decision documents that modify previously approved work shall be approved through the appropriate modification process in Part 10.

- a. Baseline Risk Assessment Technical Memoranda
- b. CMS/FS Technical Memoranda
- c. RFI/RI Work Description Document Technical Memoranda
- d. Geochemical Characterization of Background Surface Soils
- e. Other support documents for any activity covered by this Agreement as deemed appropriate by the Parties
- f. Progress reports described in Part 21
- g. Reconnaissance Level Characterization Reports

121. The following draft documents shall be subject to public comment:

- a. Draft Permit Modifications/Proposed Plans
- b. PAMs
- c. IM/IRAs
- d. Closure Plans
- e. RSOPs

The length of the public comment period shall be defined during scoping. Other documents listed in paragraphs 118 and 119 that are approved through the PAM or IM/IRA process, including, for example, RSOPs, Decommissioning Operations Plans, and the Decommissioning Program Plan, shall go to public comment through the PAM or IM/IRA process.

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122. DOE shall update quarterly the list of all approved documents, other approvals, and final resolutions of dispute contained in Attachment 12, and shall provide this list to the other Parties and place a copy in each of the Repositories. All draft and final documents subject to public comment, as well as their associated responses to comments, shall also be placed in the Repositories.

PART 10 CHANGES TO WORK

123. The Parties intend that, using the consultative process, they can substantially streamline the processes for modifying or revising approved work or decision documents that may be necessary arising from planned or unforeseen circumstances during the course of implementation. This Part establishes change control procedures for RSOPs, PAMs, IM/IRAs and CAD/RODs. The goal of the change control process is to keep previously approved elements of work at RFETS moving towards a timely, cost-effective completion while satisfying the underlying objective for which original approval was granted. For work being done under other types of decision documents, the Project Coordinators shall establish appropriate time frames and procedures consistent with the nature of the processes described below.

124. DOE shall evaluate baseline and regulatory milestone impacts associated with approved changes. If DOE finds the change will affect regulatory milestones, DOE shall identify proposed modifications to the regulatory milestones pursuant to Part 12 (Changes to Regulatory Milestones) and notify the other Parties of modifications to the baseline as provided below. If DOE finds that the change to work does not impact regulatory milestones, DOE shall, after consultation with the other Parties, modify the baseline. Upon agreement or the resolution of a dispute that a change to work is necessary, then DOE shall amend the relevant Work Description Document(s) to reflect the change.

125. If DOE desires to make a major modification to work being done pursuant to an RSOP, DOE must go through the review and approval process for modifications to either a PAM or an IM/IRA, whichever is appropriate. To make a minor modification to work being done under an RSOP, DOE's Project Coordinator shall submit written notice to the LRA's Project Coordinator, along with appropriate justification, not less than seven days prior to when DOE desires to effect the modification. While there is no formal requirement that the LRA approve minor modifications, the LRA's Project Coordinator may issue a Stop Work Order within seven days of receipt of the notification of any such modification.

126. DOE must initiate a request to make a major modification to work being done pursuant to a PAM in writing, with adequate justification, to the LRA Project Coordinator not less than 14 days prior to when DOE desires to execute or begin to execute the planned changes. The LRA's Project Coordinator shall review the request and either approve it, or deny it with an explanation, within seven days after receipt of the request. To make a minor modification to work being done pursuant to a PAM, DOE shall submit written notice to the LRA, along with appropriate justification, not less than seven days prior to when DOE desires to effect the modification. While there is no formal requirement that the LRA approve minor modifications to a PAM, the LRA may issue a Stop Work Order within seven days of receipt of the notification of any such modification.

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127. To initiate a major modification to work being done pursuant to an IM/TRA, DOE shall submit a request in writing with appropriate justification not less than 30 days prior to when DOE desires to execute or begin to execute the proposed changes. The LRA shall review such request and approve it, or deny it with explanation, in writing within 21 days after its receipt. To initiate a minor modification to work being done pursuant to an IM/TRA, DOE shall submit a written request to the LRA with appropriate justification not less than 21 days prior to when DOE desires to execute or begin to execute the proposed changes. The LRA shall review such request and approve it or deny it with an explanation in writing within seven days after its receipt.

128. To make a major modification to work being done pursuant to a CAD/ROD, DOE shall submit a written request, accompanied by appropriate justification, to the LRA not less than 90 days prior to when DOE desires to execute or begin to execute the changes. Concurrent with this submittal, DOE shall provide public notice of an opportunity for a 30 day public comment period regarding the modification. The LRA shall review such request and the public comments and approve the modification, or deny it with a written explanation, within 30 days after the close of the public comment period.

129. If DOE desires to modify an RSOP, it shall proceed through the document review process in paragraphs 112 or 113 and 114-115.

130. If DOE's Project Coordinator identifies the need to make a field modification for work being done under any type of decision document, she or he shall give verbal notice to the LRA's Project Coordinator within one day after making the modification, followed by a written justification within no more than seven days. While there is no formal requirement that the LRA approve field modifications, the LRA may discuss its concerns with DOE. If the LRA Project Coordinator requires a field modification, DOE and the LRA shall discuss the requirement and come to resolution within 24 hours from request for the field modification. Unless a stop work order is issued by the LRA, if the Parties do not come to agreement within 24 hours, the operations may continue pending dispute resolution pursuant to Part 15, Subpart F. If the agencies fail to reach agreement, the LRA's Project Coordinator may issue a Stop Work Order against further action on the modified work within seven days of receipt of the notification of any such modification based on a finding that the modification is resulting or will result in work being done that is (a) inadequate or defective, (b) likely to have a substantial adverse impact on other response action selection or implementation processes, (c) not within the parameters of a field modification, but rather is a minor or major modification, or (d) likely to significantly affect cost, scope, or schedule and requires further evaluation.

131. DOE will be the primary Party responsible for initiating the change process and providing sufficient time and documentation to demonstrate to the LRA's reasonable satisfaction that the proposed modification(s) or revision(s) is (are) necessary to accomplish the activity. The LRA will be responsible for internal consultation and for collecting, consolidating, and reconciling comments within the allotted time frames. During the time allotted for the LRA to respond to a proposed modification that requires approval, the DOE and LRA Project Coordinators should meet to resolve any potential barriers to approval. If agreement is reached, DOE will submit a revised proposed modification and will implement the same in accordance with this Agreement.

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If the LRA denies the modification, or approves it only with conditions unacceptable to DOE, DOE may invoke dispute resolution.

132. As described above, the Parties intend to allow an accelerated change process for minor modifications, particularly given that, while DOE must always give the LRA advance notification of a minor modification, depending on the type of work or decision document being modified, advance approval from the LRA may not be required. If the LRA disputes a minor modification, the LRA shall discuss its concerns with DOE, but if no accommodation is reached, the LRA may issue a Stop Work Order against further action on the modification based on a finding that the modification is resulting or will result in work being done that is (a) inadequate or defective, (b) likely to have a substantial adverse impact on other response action selection or implementation processes, or (c) not within the parameters of a minor modification, but instead constitutes a major modification.

PART 11 BUDGET AND WORK PLANNING

Subpart A. Budget Planning, Milestone Setting, and Identification of Target Activities

133. DOE shall use its best efforts and take all necessary steps to obtain timely funding to meet its obligations under this Agreement and shall include sufficient funds in its budget request to the President, as specified in Executive Order 12088, to support the activities to be conducted under the Agreement. DOE's compliance with the provisions of this Part shall constitute compliance with the above standard.

134. Without waiving or impairing DOE's authority over its budget and funding level submissions, DOE agrees to participate in the planning and budget formulation and execution processes as described in this Part, including the provisions for CDPHE and EPA participation. Nothing in this Agreement shall be interpreted to make the baseline itself an enforceable requirement of this Agreement, or to require CDPHE or EPA approval of the baseline. Without waiving or impairing any statutory authority, EPA and CDPHE agree to establish or revise regulatory milestones in accordance with this Part. In particular, nothing in this Part shall impair EPA's or CDPHE's discretion to determine that the scope and pace of regulated activities that can be accomplished within the RFETS EM allotment is insufficient to protect human health or the environment, or is otherwise inconsistent with the exercise of their statutory authorities.

135. It is the intent of the Parties that the EM actions governed by this Agreement shall reflect the Parties' commitment to proactively pursue and implement productivity gains and cost savings and shall consider, but not be strictly driven by the budget targets provided by OMB or DOE-HQ. Specifically, the cost of projects governed by this Agreement, along with the overall constraints of the federal budget process, timing of financial decisions, and allocation of funds, shall be considered by all Parties when establishing the scope and schedule of EM projects. To the extent that it is consistent with their statutory obligations, EPA and CDPHE intend to establish requirements for EM projects that can be accomplished within the EM funds appropriated to RFETS.

136. In accordance with the provisions of this Part, the Parties agree that DOE, in consultation with EPA and CDPHE, will maintain and revise the baselines of site activities; and EPA and

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CDPHE, in consultation with DOE, will set the regulatory milestones including completion dates for specific activities. CDPHE and EPA may use the baseline as a reference in selecting activities for establishment as regulatory milestones. The Parties, in consultation with the DNFSB, will identify the target activities. These target activities will be identified in Appendix 6 each fiscal year. The Parties further agree that the activities identified in Appendix 6 are targets that are not enforceable as requirements of this Agreement. Target activities will only be modified upon the consent of DNFSB and all Parties, through the consultation process provided in Subpart 11D. This division of responsibility is intended to give DOE significant flexibility in managing EM projects to meet regulatory milestones. Consequently, changes within the baseline shall not necessarily constitute good cause for changes to regulatory milestone dates for completion of specific activities.

137. DOE shall perform activities on the baseline set forth in Appendix 4 and according to the Work Description Document(s) developed thereunder.

138. The baseline shall be depicted in sufficient detail to identify target activities and any regulatory milestones. In addition, a listing describing each of the regulatory milestones and target activities depicted on the baseline shall be provided. The level of detail to be provided will be equivalent to the information provided in the Work Authorization Documents (WADs).

139. The time frames and terms specified in this Part are those in use beginning in the fall of 1995. If DOE's budget schedule or process changes, these paragraphs may be modified accordingly.

140. The Parties shall review the previously established baseline, regulatory milestones, and target activities annually, and shall either re-establish or revise them. To the extent that target activities need to be modified, such modifications will be accomplished through the consultation process provided in Subpart 11D.

141. DOE shall, by August 1, 1996, develop an Integrated Site-Wide Baseline that depicts activities necessary to achieve the end of the Intermediate Site Condition. The Integrated Site-Wide Baseline, from which milestones and target activities are selected, will be based on current assumptions, which may change as additional technical information is acquired, and as the Parties gain experience in implementing the RFCA. The Integrated Site-Wide Baseline will be updated at least annually.

142. EPA and CDPHE shall establish no more than 12 milestones per fiscal year. Milestones shall be designed to:

- a. provide accountability for key commitments;
- b. ensure adequate progress at the Site;
- c. provide adequate scope drivers; and
- d. facilitate budget planning and execution.

143. Following the submittal of the Integrated Site-Wide Baseline described in paragraph 141, EPA and CDPHE may establish a few key outyear milestones (i.e., beyond FY+2) to provide long-term drivers for achieving the end of the Intermediate Site Condition. This means that in the annual budget and work planning process, the Parties shall evaluate the impact of changes to near-term (i.e., FY through FY+2) milestones on DOE's ability to meet the outyear milestones. However, the Parties recognize that good cause may exist for extending a near-term milestone,

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even though it may impact DOE's ability to meet an outyear milestone. Outyear milestones shall be established consistent with the framework provided in this Part. The Parties recognize that outyear milestones are inherently subject to greater uncertainty than near-term milestones. However, the Parties also recognize that the limitation on the number of annual milestones, and the fact that DOE controls the baseline, together provide DOE with substantial management flexibility in achieving both near-term and outyear milestones. Any extension to near-term milestones will not necessarily provide good cause to extend an outyear milestone. Outyear milestones shall not be extended unless DOE demonstrates that assumptions underlying the establishment of the outyear milestones have changed or cannot be met, such that achieving the outyear milestone is no longer feasible. Determinations regarding outyear milestones are subject to the provisions of paragraph 204.

144. The Parties agree that any discussion conducted pursuant to Part 12 of this Agreement related to extending regulatory milestones that follow the completion of a target activity identified in Appendix 6 will be informed by previous discussions and agreements reached by the DNFSB and the Parties under Subpart 11D.

145. The factors to be considered in establishing, reviewing and revising the baseline, regulatory milestones, and target activities include, but are not limited to the following:

- a. the Vision;
- b. the Preamble;
- c. the logical progression toward cleanup;
- d. the reduction of short-term and long-term human health and environmental risk;
- e. existing requirements of this Agreement;
- f. the life-cycle cost of individual projects;
- g. logistic, engineering, technical, and health and safety concerns related to proposed projects;
- h. any impacts on related projects, including the costs and scheduling of such projects;
- i. detrimental impacts of significant fluctuations in resource requirements from year to year;
- j. DOE's management capabilities;
- k. new or emerging technologies;
- l. CDPHE's and EPA's oversight capabilities;
- m. changing priorities as a result of new information;
- n. the Integrated Water Management Plan;
- o. views expressed by local elected officials;
- p. the views expressed by the public;
- q. any consensus views expressed by the Rocky Flats Citizens Advisory Board;
- r. the Congressional budget appropriation, OMB apportionment, and DOE Rocky Flats EM allocation for FY, as well as the Rocky Flats EM allocation of the President's Budget for FY+1 and associated outyear funding targets;
- s. the completeness and accuracy of the scope, schedule, and costs for the tentative FY tasks;
- t. the status of ongoing projects;
- u. cost savings initiatives and productivity improvements;
- v. DNFSB recommendations to DOE; and
- w. the Environmental Restoration Ranking.

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146. The review and re-establishment or revision of the baseline and regulatory milestones, and the identification of target activities for the upcoming FY and FY+1 shall occur as follows:

a. Between July and October of each year, the Parties shall:

- (1) evaluate the current schedule, cost and funding status of all projects in progress in the just-ending fiscal year, particularly those activities or projects that are on the critical path to meeting regulatory milestones in the upcoming two fiscal years;
- (2) share the results of this evaluation with local elected officials and the Rocky Flats Citizens Advisory Board (CAB);
- (3) consult in developing, verifying and reviewing Budget Formulation/Execution Documents for the upcoming fiscal year; and
- (4) incorporate the most recent information available concerning project status and Congressional actions on the upcoming FY budget that may affect existing regulatory milestones, target activities, and baselines.

b. Within 45 days after Congressional appropriation of the FY budget, DOE shall brief EPA, CDPHE and the CAB on the budget appropriation and tentative funding allocations for the new fiscal year at the WAD level. If there is a delay in Congressional appropriations beyond the first day of the new federal fiscal year, Rocky Flats Field Office (RFEO) shall inform EPA, CDPHE, and the CAB of any continuing resolutions, and of the impact of the delay on RFETS's ability to meet target activities or regulatory milestones and other requirements of this Agreement. EPA, CDPHE, and the CAB will review these actions and may recommend reallocation of available funds.

c. Within 10 days of receipt of the DOE allocation to RFETS, but no later than 60 days after the OMB apportionment of DOE's FY appropriation, the Parties shall evaluate the schedule, cost, and funding status of all projects scheduled to be implemented during the FY and FY+1 in light of the factors set forth in paragraph 145 and in light of Subpart 11C. Any Party or the CAB may propose changes to the baselines, target activities or regulatory milestones for FY or FY+1. After the Parties have completed their evaluation of the baselines, target activities and regulatory milestones for FY and FY+1, EPA and CDPHE shall re-establish the regulatory milestones, or establish modified ones, as appropriate. DOE shall revise the baselines as necessary to ensure that the re-established or modified regulatory milestones are fully incorporated therein.

(1) If the RFETS EM allocation exceeds the projected cost for the scope of RFETS EM projects defined for FY, DOE shall recommend the implementation of additional scope or the acceleration of activities during the FY commensurate with the difference in projected costs. DOE may propose using part or all of the excess allocation for activities not covered by this Agreement.

(2) If the projected cost for the scope of RFETS EM projects defined for FY exceeds the RFETS EM allocation for the FY, the Parties shall attempt to agree on a revised

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scope or pace of RFETS EM activities that can be accomplished within the RFETS EM allocation. To the extent that the Parties are unable to agree on a revised scope or pace of EM activities and milestones regulated under this Agreement for FY, EPA and CDPHE shall unilaterally establish milestones for FY. DOE may dispute the establishment of such milestones pursuant to Part 15D. Following any final decision that establishes regulatory milestones for FY that DOE believes cannot be met due to lack of funding, DOE shall make a good faith effort to comply with such milestones. A good faith effort may, but does not necessarily, include one or more of the following actions: rescoping or rescheduling the baseline consistent with the regulatory milestones and target activities; developing and implementing new productivity improvements or cost-saving measures, requesting re-allotments or reprogramming of appropriated funds, and seeking supplemental appropriations. If DOE subsequently fails to meet a regulatory milestone, it retains the right to assert the defenses described in paragraph 249 in response to any enforcement action by EPA or CDPHE.

- (3) The Parties will use their best efforts to complete the processes described in this paragraph by the end of the first quarter of each fiscal year. To the extent that the Parties cannot reach consensus regarding either the baselines or regulatory milestones for FY and FY+1, EPA and CDPHE shall unilaterally establish the milestones. Those portions of the baselines or regulatory milestones for which the Parties cannot reach consensus shall be subject to the appropriate dispute resolution provisions of Subpart 15D. Existing regulatory milestones will remain binding pending resolution of the dispute.

147. The review and revision of the baseline, establishment of regulatory milestones, and identification of target activities for FY+2 shall occur as follows:

- a. Within one week after RFFO receipt of EM planning and/or budget guidance for FY+2, RFFO shall provide a copy of such guidance to CDPHE, EPA, and the CAB. Within one week after receipt by RFFO of target level funding guidance, it shall provide a copy of such guidance to CDPHE, EPA, and the CAB. Within three weeks after receipt by RFFO of target level funding guidance, it shall provide a preliminary assessment of its impacts to CDPHE, EPA, and the CAB. RFFO shall also provide a copy of its initial contractor budget guidance to CDPHE, EPA, and the CAB within two weeks after its issuance.
- b. Following any final determination of the baselines, target activities and regulatory milestones for FY and FY+1 (described in the preceding paragraph), DOE, in consultation with EPA, CDPHE, and the CAB, shall propose the tentative activities and the relative priorities of those activities to be performed in FY+2 pursuant to this Agreement. The tentative activities and relative priorities identified shall reflect the newly revised baselines for FY and FY+1 and evaluation of the factors described in paragraph 145. CDPHE and EPA shall approve or modify the tentative activities and such approval or modification shall not be subject to dispute resolution until after the conclusion of the steps described in the following sub-paragraph.

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c. Within 60 days of identification of the tentative FY+2 activities, the Parties shall establish the FY+2 baselines and regulatory milestones, and identify target activities for FY+2, considering the factors set forth in paragraph 145. DOE shall use its best efforts to identify early on any constraints that its budgetary targets would impose on FY+2 activities. To the extent that the Parties cannot reach consensus on the FY+2 baselines and regulatory milestones, EPA and CDPHE shall unilaterally establish regulatory milestones for FY+2, and may provide recommendations to DOE on the scope and schedule of baseline activities. The dispute resolution provisions of Subpart 15D may be applied to those portions of the baselines or regulatory milestones for which the Parties cannot reach consensus. The regulatory milestones established by EPA and CDPHE shall be binding pending resolution of the dispute. EPA and CDPHE shall identify to RFFO which of these recommendations shall be included in RFFO's proposed program for FY+2, in accordance with subparagraph (d), below. DOE will develop the proposed program at the level of detail and quality required to meet EM planning and/or budget guidance for FY+2. DOE shall have the opportunity to discuss with EPA and CDPHE the projected scope, cost and schedule to develop the proposed program activities recommended for inclusion in the budget pursuant to subparagraph (d), below, and whether the cost, scope and schedule can be reasonably developed in time to meet DOE's budget submittal schedules. EPA and CDPHE may choose to revise or withdraw recommendations based on these discussions. If the development of the proposed program delays timely completion of any regulatory milestone as then currently planned, it shall constitute good cause for a change pursuant to paragraph 166.e. Recognizing that the development of scope, cost and schedule for proposed program activities will require the expenditure of resources that might have to be allocated away from activities already in the baseline, these recommendations shall be judicious and made in good faith.

d. RFFO shall, in consultation with EPA and CDPHE, develop a proposed program (described in Budget Formulation/Execution Documents) sufficient to support the agreed-upon FY+2 baseline, target activities, and regulatory milestones identified pursuant to the preceding sub-paragraph; if the Parties have been unable to agree upon a baseline and/or regulatory milestones, RFFO shall develop a proposed program sufficient to support the FY+2 baseline (including activities recommended for inclusion by EPA and CDPHE pursuant to subparagraph (c), above) and regulatory milestones identified by EPA and CDPHE. If necessary, RFFO will prepare additional funding scenarios consistent with the DOE-HQ funding guidance (the "target level funding case"). In some cases, the target level funding may be insufficient to fund all tasks in the agreed-upon baseline (or, if there is not agreement on the baseline, all activities identified for inclusion in the baseline by EPA and CDPHE pursuant to subparagraph (c), above). In such cases, RFFO shall, in consultation with EPA and CDPHE, describe the resulting schedule impacts, including projections of any regulatory milestones or target activities that may be missed and any regulatory requirements outside the scope of this Agreement that may be impacted. RFFO shall include this description with the submittal of its proposed budget to DOE-HQ. If EPA and CDPHE disagree with RFFO's analysis of the impacts of the target level funding case, they may individually or jointly prepare a description of those impacts. RFFO shall forward the Parties' descriptions to DOE-HQ with its own description of the impacts. If these issues are not subsequently resolved prior to DOE's

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submission of its budget request to OMB, DOE-HQ shall forward all Parties' descriptions of the impacts to OMB with its budget submission.

- e. At the conclusion of the process established by this paragraph and any related dispute resolution, the Parties will transmit to the CAB in writing the list of regulatory milestones established and target activities identified for FY+2, along with an explanation of how the Parties addressed any CAB recommendations regarding those milestones and target activities.

148. When milestones are established or re-established, DOE shall update Attachment 8 to include the newly established or-reestablished milestones. When target activities are identified or re-identified, DOE shall update Appendix 6.

149. DOE shall keep EPA, CDPHE, local elected officials, and the CAB adequately informed of budgetary matters that may affect implementation of the RFCA as specified below:

- a. Within ten business days of submission of the President's budget to Congress, DOE shall submit to EPA, CDPHE, and the CAB a summary of the budget request forwarded to DOE-HQ by RFFO, and submit to EPA, CDPHE, and the CAB a summary of the Site-EM budget request forwarded by DOE-HQ to OMB associated with the President's budget.
- b. Within 60 days after the President's submission of the FY+1 budget to Congress, RFFO shall brief EPA, CDPHE, and the CAB on those aspects of the President's budget request relating to RFETS at the Program Baseline Summary Document level of detail, or at a lower level of detail if available. At this briefing, RFFO shall provide EPA, CDPHE, and the CAB with a written description of any differences between the funding levels identified in the Budget Formulation/Execution Documents that were prepared pursuant to the paragraph 147.d in the preceding fiscal year to support what was then the FY+2 baseline, target activities and regulatory milestones, and is now the FY+1 baseline, target activities and regulatory milestones, and the actual funding levels included in the President's budget request to Congress, along with an assessment of the impact such differences may have on DOE's ability to meet target activities, regulatory milestones or other requirements established under this Agreement, or other environmental requirements not regulated under this Agreement.
- c. DOE shall notify and discuss with EPA, CDPHE, and the CAB, prior to transmittal to OMB, any budget amendment, supplemental appropriation request, reprogramming request, and any analyses of any corresponding impacts upon the workscope and schedules and DOE's ability to meet target activities or regulatory milestones and other requirements of this Agreement, and other environmental requirements not regulated under this Agreement, with and without the amendment, supplemental appropriation or reprogramming request.

Subpart B. Budget Execution

150. The activities described in this Subpart are directed at execution of the budget for the current FY.

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151. DOE, CDPHE and EPA Project Coordinators shall meet periodically throughout the FY to monitor and discuss the status of projects scheduled during the year and cost savings initiatives and productivity improvements associated with those projects.
152. RFFO shall provide EPA and CDPHE with copies of the Site Program Execution Guidance at the same time it provides such guidance to its contractors.
153. RFFO shall consult with EPA and CDPHE in reviewing the WADs prepared by its contractor.
154. Throughout the FY, DOE shall promptly notify EPA, CDPHE, local elected officials, and the CAB of any proposed site-specific or major programmatic action, if such action is likely to have an impact on DOE's ability to meet the baselines, target activities or regulatory milestones in this Agreement. DOE shall consider any comments CDPHE, EPA, local elected officials, or the CAB may provide in implementing the proposed action.
155. Within 30 days following the completion of DOE's annual midyear management review (approximately April-May of each year), RFFO shall brief EPA, CDPHE, and the CAB on any decisions that affect regulatory milestones or target activities under this Agreement.
156. DOE shall provide EPA, CDPHE, and the CAB with a copy of the reports specified in section 3153 of the Defense Authorization Act for fiscal year 1994 within ten business days of their submission to Congress.
157. Neither the process described in this Part, nor CDPHE's participation in it, constitutes a waiver by the State of its position that the Executive Branch is obligated to seek full funding for all activities required by this Agreement, and that DOE's obligation to comply with the requirements of this Agreement is not contingent on funding. In addition, acceptance of the process described in this Part, does not constitute a waiver by DOE that its obligations under this Agreement are subject to the availability of appropriated funds and the provisions of the Anti-Deficiency Act, 31 U.S.C. Sec. 1341.

Subpart C. Cost Savings Initiatives and Productivity Improvements

158. The Parties agree to consult during the RFETS budget planning and execution processes to identify and evaluate opportunities and incentives to improve productivity and reduce the costs associated with environmental management activities at the Site and, whenever reasonable, implement such measures. While the Parties recognize the high value of identifying and implementing cost savings measures and productivity improvements, the identification and implementation of such measures and improvements are not requirements of this Agreement. However, nothing in this Part shall preclude EPA or CDPHE from requiring actions within their statutory authority that may incidentally result in cost savings or productivity improvements.
159. The Parties recognize that efficiently, cost-effectively managing and conducting activities at RFETS is a key element to successfully achieving the Preamble objectives. To this end, standards, requirements and practices shall be regularly reviewed to determine that activities at RFETS are conducted in a manner that is both necessary and sufficient to achieve compliance

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with requirements; to protect workers, the public, and the environment; and to accomplish the Preamble objectives expeditiously and efficiently. To maximize the efficient use of all organizations' resources, the Parties shall conduct and participate in such reviews internally and in cooperation with the others regarding matters of shared interests. Each shall provide to the others information about the nature, status, and implementation of its internal "necessary and sufficient" reviews. If cost savings are gained as a result of these reviews, that information shall also be provided to DOE for use in determining overall cost savings under this Part.

160. RFETS will have an approved Annual Cost Baseline prior to the implementation of the following paragraphs concerning application of cost savings. By August 15 of each year, DOE, in consultation with the regulators, shall review the proposed Annual Cost Baseline submitted by its contractor, shall make any appropriate changes, and shall approve the Annual Cost Baseline within thirty days of receiving RFETS' fiscal year allocation.

161. A percentage of cost savings presumptively will be retained at RFETS for use in performing additional EM activities. The presumption of on-site retention of cost savings may be overcome if DOE headquarters determines that there is an imminent danger or significant threats to human health or the environment at another DOE site, and the application of the RFETS cost savings is necessary to abate such danger or threat. DOE headquarters agrees to consult with EPA and CDPHE prior to applying the presumptive share to another DOE facility. Determinations with respect to overcoming the presumption that cost and productivity savings will stay at RFETS lie within DOE's sole discretion, and shall not be subject to the dispute resolution provisions of this Agreement.

162. The percentage of cost savings to be retained at RFETS is 60% in the first year following the adoption of an approved cost baseline (FY 1997), 75% in the second year, and 90% in the third year and every year thereafter. To the extent that any cost savings are attributed to RFETS contractors, the percentages cited in this paragraph apply to the cost savings remaining after any contractual obligations have been paid to such contractors.

Subpart D. Consultation and Accountability for Target Activities

163. To the extent that target activities identified in Appendix 6 need to be modified or are not met, DOE, in consultation with and after review by EPA and CDPHE, will develop an appropriate means of communication to inform the public of the need to modify a target or that a target has been missed, the work planned to address or correct the problem, and the effect that the modified target or missed target is expected to have on DOE's ability to meet any regulatory milestone. This public information will be widely disseminated to the general public, including the Citizens Advisory Board and other groups having an interest in RFETS."

164. In the event DOE determines that a target identified in Appendix 6 needs to be modified (e.g., completion date change) or if a target is not met, DOE will submit a plan to the DNFSB, EPA, and CDPHE to address the issue. For a proposed modification to a target, DOE will notify the DNFSB, EPA and CDPHE, and submit a plan within 30 days of such notification. For a missed target, DOE will also submit a plan within 30 days of missing the target. In developing any such plan, DOE will include:

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- a. Information on the status of the activity covered by the target;
- b. An assessment of whether a delay in meeting the target will affect DOE's ability to meet any regulatory milestone; and
- c. A description of any steps that are planned to accelerate or modify precursor activities addressed by the target in order to accomplish a regulatory milestone on the schedule specified in this Agreement.

Additional time for DOE's submittal of the plan to the DNFSB, EPA, and CDPHE may be provided upon agreement of the DNFSB and the Parties. The DNFSB, EPA, and CDPHE will provide within 30 days of receipt of DOE's plan any comments on the plan to DOE, and DOE will address the comments in a revised plan. Additional time for submittal of comments to DOE may be established upon agreement of the DNFSB and the Parties. To the extent that comments on the plan are inconsistent, if DOE does not agree with the comments, or if DOE, the DNFSB, EPA, and CDPHE do not agree on the adequacy of the plan, then DOE will hold a meeting with the DNFSB, EPA, and CDPHE to reach agreement on the necessary revisions to the plan. The Parties agree that the DNFSB will participate in these discussions and moderate the resolution of any safety issues at nuclear facilities. Upon completion of the plan, DOE will regularly advise the DNFSB, EPA, and CDPHE of the status of its implementation and the status of the progress made to meet any affected regulatory milestone.

PART 12 CHANGES TO REGULATORY MILESTONES

165. A regulatory milestone that is established according to the provisions of this Agreement shall be changed upon receipt of a timely request for change, provided good cause, as defined in this Part, exists for the requested change. Any request for change by any Party shall be submitted in writing and shall specify:

- a. the regulatory milestone that is sought to be changed;
- b. the length of the change sought;
- c. the good cause(s) for the change; and
- d. any related regulatory milestone that would be affected if the change were granted.

166. Good cause for a change includes the following:

- a. An event of force majeure;
- b. A delay caused by EPA or CDPHE's failure to meet any requirement of this Agreement;
- c. A delay caused by the initiation of judicial action;
- d. A delay caused, or which is likely to be caused, by the grant of a change in regard to another regulatory milestone;
- e. A delay caused by a change to a planning assumption, as specified in the baseline, that results from either a request by CDPHE or the EPA, or is identified by DOE, but does not represent a failure of DOE or its contractors to properly manage the work;
- f. A delay caused by a stop-work order issued by EPA or CDPHE;
- g. a delay caused by the requirement to perform additional work under CERCLA §§ 104(a)(1)(A), 104(a)(1)(B), or 106(a); and
- h. Anything else mutually agreed to by the Parties as constituting good cause.

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167. Requests for a change for one or more regulatory milestones shall be submitted no less than 30 days prior to the date of the first regulatory milestone for which the change is sought, except for changes sought on the basis of a force majeure.

168. A determination regarding the existence of good cause may only be disputed in the context of changing a regulatory milestone.

169. Within 14 days of receipt of a request by DOE for a change of a regulatory milestone, the LRA, after consultation with the SRA, shall grant, grant in part, or deny the request. The SRA may dispute the LRA's decision, pursuant to the expedited dispute resolution provisions of Subpart 15E. DOE may dispute a denial or partial grant of a change request in accordance with Subpart 15B.

170. A timely request for a change, as defined in paragraph 167, shall toll any assessment of stipulated penalties or application for judicial enforcement of the affected regulatory milestone until a decision is reached on whether the requested change will be approved. If dispute resolution is invoked and the requested change is denied, stipulated penalties may be assessed and may accrue from the date of the original regulatory milestone. Following the grant of a change, the regulatory milestone can only be enforced as most recently changed.

PART 13 FORCE MAJEURE

171. A force majeure means any unforeseen or unexpected event arising from factors beyond the control of a Party that could not be avoided or overcome by due diligence and that causes a delay in, or prevents the performance of, any obligation under this Agreement. Force majeure may arise by reason of events including, but not limited to:

- a. acts of God, fire, war, insurrection, civil disturbance, or explosion;
- b. unanticipated breakage or accident to machinery, equipment or lines of pipe despite reasonably diligent maintenance;
- c. adverse weather conditions that could not reasonably be anticipated;
- d. restraint by court order or order of public authority;
- e. inability to obtain, consistent with statutory requirements and after exercise of reasonable diligence, any necessary authorizations, approvals, permits, or licenses due to action or inaction of any governmental agency or authority other than the DOE;
- f. delays caused by compliance with applicable statutes or regulations governing contracting, procurement or acquisition procedures, despite the exercise of reasonable diligence; and
- g. any strike or other labor dispute not within the control of the Parties affected thereby.

Force majeure shall not include increased costs or expenses of response actions, whether or not anticipated at the time such response actions were initiated.

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173. DOE shall bear the burden of establishing that a delay was caused by an unforeseen or unexpected event or occurrence, that the event was beyond DOE's control, that the event could not have been avoided or overcome by due diligence, and that the event delayed or prevented performance by a date or in the manner required by this Agreement.

174. To assert a claim of force majeure, DOE shall provide verbal notification to the LRA, or, in cases that affect Site-Wide issues, both CDPHE and EPA, within two business days after DOE becomes aware, or should have become aware, of the effect of the event on DOE's ability to perform the obligations of the Agreement creating the claim of force majeure, followed by written confirmation within an additional business day. Failure to assert a claim of force majeure within this time frame shall constitute a waiver of DOE's right to dispute any denial of an extension request or assessment of stipulated penalties on the basis of the event giving rise to the force majeure.

175. The LRA, or, for Site-Wide issues, both EPA and CDPHE shall accept, accept in part, or reject DOE's claim of force majeure within 14 days of receipt of the written notice of claim. DOE may only dispute the LRA's decision on a claim of force majeure in the context of the LRA's decision on a change to a regulatory milestone. Nothing in the preceding sentence shall prevent DOE from raising force majeure as a defense to any action by the State or EPA to enforce a requirement of this Agreement.

PART 14 STOP WORK ORDERS

176. DOE, the LRA, or, in the case of a Site-Wide issue, the SRA, may issue a stop work order for work covered by this Agreement, whether or not the particular work at issue is already the subject of dispute resolution. The stop work order may be issued in accordance with Part 10 or Subpart 15F, or if the Party believes a particular task or portion of work (1) is inadequate or defective, or (2) is likely to have a substantial adverse effect on other response action selection or implementation processes. The provisions of this Part shall not be invoked for any disagreement on the selection of remedial/corrective action. Issuance of a stop work order shall be made in writing by the DRC member of the requesting Party, sent to the Dispute Resolution Committee (see Part 15) members of other Parties, as appropriate, and shall explain why the stop work order is required.

177. Work affected by the stop work order will be discontinued immediately for up to five business days pending determination by the DRC pursuant to Subpart 15B or 15E, as appropriate (LRA or Site-Wide). The DRC shall confer and meet as necessary during this period. If the DRC does not concur in the need for work to stop, work shall remain stopped pending immediate elevation to the SEC. Once the issue is referred to the SEC, the procedures of Subpart 15B shall apply, except that the LRA member of the SEC shall render its decision within five business days after receipt of notice from the DRC. To the extent practicable, prior notification shall be given to the other Parties that a stop work order is forthcoming.

178. If the Parties agree that the stop work order is necessary, the stop work order shall constitute a timely request for change to a regulatory milestone, pursuant to Part 12 (Changes to Regulatory Milestones). DOE's time periods for performance of the work subject to the stop work order, as well as the time period for any other work dependent upon the work which was

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stopped, shall be extended pursuant to Part 12 of this Agreement for such period of time equivalent to the time in which work was stopped, or as agreed by the Parties.

179. Resumption of work following issuance of a stop work order will be authorized by the submittal of a written decision of the DRC or the SEC. The written decision can be of two types: 1) the DRC or SEC decision states that the stop work order is rescinded and that work can resume immediately; or 2) the DRC or SEC decision upholds the stop work order and states the conditions that must exist before the work can be resumed. In this instance the decision will identify the LRA that will make the determination that the conditions for work resumption have been satisfied only if the designation of LRA should change as a result of the work resumption decision. When the designated LRA determines that the conditions to resume work have been satisfied it will advise DOE, in writing, that the stop work order has been lifted and that DOE is authorized to proceed with the work.

180. Upon receipt of the written decision to resume work or when the LRA has determined that the conditions to resume work have been satisfied, DOE shall determine the magnitude of baseline and regulatory milestone changes resulting from the stop work order. DOE shall then request these changes to the regulatory milestones pursuant to Part 12.

PART 15 RESOLUTION OF DISPUTES

Subpart A. General Provisions Regarding Dispute Resolution

81. If a dispute subject to dispute resolution under this Agreement arises, the appropriate procedures of this Part shall apply. The Parties recognize the value of speedily resolving ripe disputes. Thus, each Party's responsible staff level personnel are encouraged to raise disputed matters quickly for resolution in accordance with this Part. Nevertheless, the Parties shall use their best efforts to informally resolve issues. The Parties agree to invoke dispute resolution only for significant issues; to utilize the dispute resolution process only in good faith; to use their best efforts to comply with the timeframes for dispute resolution established in this Part; and to expedite, to the extent possible, the dispute resolution process whenever it is used.

182. The time frames specified in this Part shall begin to run on the last date that a party to the dispute receives the notice of dispute in accordance with Part 22.

183. Subject to Part 18 (Reservation Of Rights) the Parties shall be bound by and abide by all terms and conditions of any final resolution of dispute obtained pursuant to this Part.

184. The pendency of any dispute under this Part shall not affect DOE's responsibility for timely performance of the work required by this Agreement, except for (1) cases where the final LRA decision-maker concurs that, under the particular circumstances (e.g., an event of force majeure) associated with the dispute, an extension is appropriate; or (2) when DOE has delivered a change request to CDPHE and EPA 120 days or more in advance of a regulatory milestone, and CDPHE or EPA action on the change request has been disputed. In the latter case, the time period for completion of the work shall be extended for a period of time usually not to exceed any time taken beyond 120 days to resolve any good faith dispute.

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185. CDPHE or EPA may bring an administrative or judicial enforcement action for any violation of the requirements of this Agreement without first initiating dispute resolution. Except as provided in paragraph 238.c, if a matter is already subject to dispute resolution, CDPHE and EPA agree to participate in good faith in the dispute resolution process prior to bringing any such enforcement action. DOE may not bring an administrative or judicial action challenging any action by CDPHE or EPA that is subject to dispute without first exhausting the appropriate dispute resolution process provided in this Part.

186. Within 21 days of the final resolution of any dispute under this Part, DOE shall incorporate the resolution and final determination into the appropriate plan, schedule, or procedure(s), and proceed to implement the activity according to the amended plan, schedule, or procedure(s). DOE shall notify the other Parties as to the action(s) taken to comply with the final resolution of a dispute. This time period may be extended as agreed by the Parties.

187. The Dispute Resolution Committee (DRC) is the first level of formal dispute resolution among all three Parties. CDPHE's designated member of the DRC is the Hazardous Materials and Waste Management Division Director. DOE's designated member of the DRC is the Assistant Manager for Environmental Compliance, Rocky Flats Field Office. The EPA member of the DRC is the Region VIII Assistant Regional Administrator for Ecosystems Protection and Remediation. The Senior Executive Committee (SEC) is the second level of dispute resolution among all three Parties. The SEC will serve as the forum for resolving appeals from the DRC. CDPHE's representative on the SEC shall be the Director, Office of Environment. The EPA's representative on the SEC is the Region VIII Administrator. The DOE's representative on the SEC is the Manager, Rocky Flats Field Office. Written notice of any delegation of authority from a Party's designated DRC or SEC member shall be provided to the other Parties, pursuant to the procedures of Part 27 (Notification). It is the Parties' intention that the SEC members implement their responsibilities personally, to the extent practicable. The State-EPA Dispute Resolution Committee (SEDRC) and the State-EPA Senior Executive Committee (SESEC) shall have the same composition as the DRC and SEC, respectively, but the DOE member of the SEDRC and the SESEC shall not have a vote for purposes of determining consensus in the decisions of those bodies.

Subpart B. DOE Disputes Regarding Decisions by the Lead Regulatory Agency and Other Specified Disputes

188. DOE may invoke the dispute resolution provisions of this Subpart for the following decisions of the LRA:

- a. disapproval of a proposed final document;
- b. denial or partial grant of a change requested for a regulatory milestone;
- c. those matters specified in paragraph 228 (Stipulated Penalties);
- d. stop work orders;
- e. denial of a proposed modification to work;
- f. disputes over decisions on the Integrated Monitoring Plan; or
- g. disputes over the imposition of fees by CDPHE.

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- 1 189. Upon agreement of all Parties, the dispute resolution provisions of this Subpart may be invoked
2 to resolve disputes over the interpretation or implementation of this Agreement. In cases where
3 the dispute concerns a Site-Wide matter, or where the Parties cannot agree whether EPA or
4 CDPHE should be the LRA, the outcome of each level of dispute shall either be a consensus
5 resolution or a joint statement of the differing positions.
6
- 7 190. The provisions of this Subpart may be invoked by any Party to resolve a dispute over a proposed
8 amendment to this Agreement. In such a case, the outcome of each level of dispute shall either
9 be a consensus resolution or a joint statement of the differing positions.
0
- 1 191. DOE may also invoke the dispute resolution provisions of this Subpart as specifically provided
2 in this Agreement.
3
- 4 192. To invoke a dispute under this Subpart, the DOE Project Coordinator shall submit to the
5 members of the DRC within 14 days of the disputed action a Written Notice of Dispute, setting
6 forth in a clear and precise manner the particular issues in dispute, the nature of the dispute, the
7 DOE's position with respect to the dispute, and the information relied upon to support its
8 position. The DOE Project Coordinator shall develop the Written Notice of Dispute in
9 consultation with the other Project Coordinators and shall include in the Written Notice of
0 Dispute any positions and supporting information provided by the other Project Coordinators
1 within the 14 day period. The DRC will serve as a forum for resolution of disputes for which
2 agreement has not been reached by the Project Coordinators, unless the DRC, by unanimous
3 consent, agrees to elevate the dispute immediately to the SEC for resolution.
- 4 For disputes raised by DOE, the DRC or SEC member representing the Support Regulatory
5 Agency for the disputed issue may, with the consent of either DOE or the LRA, participate in
6 dispute resolution on that disputed issue. The SRA's involvement (or lack thereof) in the dispute
7 resolution process shall not constitute cause to delay the dispute resolution process.
- 8 194. If the DRC has not elevated the dispute to the SEC by unanimous consent, the DRC shall have
9 21 days from receipt of the Written Notice of Dispute to resolve the dispute unanimously and
0 issue a written decision. If the DRC, after accepting the dispute for its review, is unable to
1 resolve the dispute within this 21-day period, the LRA DRC member shall issue a written
2 decision. This decision may be appealed to the SEC level by DOE upon notice to the other
3 Parties within seven days of the decision by the LRA's DRC member. Upon such appeal, the
4 written decision of the LRA's DRC member, the Written Notice of Dispute, and any supporting
5 information shall be forwarded to the SEC for resolution. If the LRA DRC member determines
6 that the dispute is frivolous, he or she shall include such determination in the written decision,
7 together with an explanation of the reasons supporting the determination.
- 8 195. The SEC members shall, as appropriate, confer, meet, and exert their best efforts to resolve the
9 dispute and issue a written decision. If unanimous resolution of the dispute is not reached within
0 21 days, the LRA SEC member shall issue a written final decision, except as provided by either
1 of the following two paragraphs.
- 2 Where EPA is the LRA, if, during the 21 day period for SEC resolution, the members of the
3 SEC unanimously determine that the nature of the dispute is nationally significant, they may

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request that the dispute be elevated to the Administrator of EPA. Alternatively, if within 14 days of the Regional Administrator's decision, the Secretary of Energy makes a written determination that the dispute is nationally significant, or the Governor makes a written determination that the dispute is a matter of significant state policy, either the Secretary or the Governor may elevate the dispute to the EPA Administrator in accordance with all applicable laws and procedures. Upon request and prior to resolving the dispute, the Administrator of EPA shall meet and confer with the Secretary of Energy and the Governor or his designee to discuss the issue(s) under dispute. Upon resolution, the Administrator shall provide DOE, the Governor, and CDPHE with a written decision within 21 days of the elevation of the dispute setting forth the final resolution of the dispute.

197. Except as provided in the following paragraph, where CDPHE is the LRA, if DOE wishes to challenge the decision of the Director of the Office of Environment, it must appeal the Director's decision in accordance with applicable law. For purposes of appeal, the Director's decision shall become final 14 days after issuance, unless, within that time period, the Secretary or Governor elevates the matter pursuant to the following paragraph.

198. Where CDPHE is the LRA, if, during the 21-day period for SEC resolution, the members of the SEC unanimously determine that the dispute involves significant policy issues, they may request that the dispute be elevated to the Governor or his designee for resolution. Alternatively, if within 14 days of the decision of the Director of the Office of Environment, the Secretary of Energy or her designee makes a written determination that the dispute is nationally significant, or the Governor makes a written determination that the dispute is a matter of significant state policy, either the Secretary or her designee or the Governor or his designee may elevate the dispute to the Governor or his designee. Upon request and prior to resolving the dispute, the Governor or his designee shall meet and confer with the Secretary of DOE and the Regional Administrator to discuss the issue(s) under dispute. Upon resolution, the Governor or his designee shall provide DOE and EPA with a written decision within 21 days of the elevation of the dispute setting forth final resolution of the dispute. This decision may be appealed in accordance with applicable law. The time for bringing any such appeal shall run from the date of the Governor's (or his designee's) decision.

199. DOE disputes of Site-Wide matters shall follow the provisions of this Subpart, except that both EPA and CDPHE shall be deemed to be the LRA. If CDPHE and EPA members of the SEC are unable to reach agreement, the provisions of paragraphs 211-212 shall apply in lieu of the provisions of paragraphs 195-197.

Subpart C. Disputes Regarding Additional Work Required under CERCLA

200. DOE may invoke the dispute resolution provision of this Subpart where activities or circumstances at the Site give rise to a regulator determination that additional work is required because the jurisdictional elements described either in CERCLA §§ 104(a)(1)(A), (a)(1)(B), or 106(a) exist. DOE or CDPHE may invoke the provisions of this Subpart regarding EPA determinations made under paragraph 254.

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201. Disputes under this Subpart may be invoked only after the regulator notifies DOE of the additional requirements that it deems necessary. DOE will not dispute regulator information requests.

202. Disputes under this Subpart will be limited to the following issues:

- a. whether the jurisdictional elements described either in CERCLA §§ 104(a)(1)(A), (a)(1)(B), or 106(a) exist;
- b. whether the activity or circumstance giving rise to the jurisdictional elements described either in CERCLA §§ 104(a)(1)(A), (a)(1)(B), or 106(a) is adequately regulated by other federal or state laws; or
- c. whether the additional work required by the regulator or proposed by DOE will mitigate or abate the circumstances giving rise to the jurisdictional elements described either in CERCLA §§ 104(a)(1)(A), (a)(1)(B), or 106(a).

203. Disputes under this Subpart shall follow the procedures set forth in Subpart B (Disputes Regarding Decisions by the Lead Regulatory Agency), except as provided in paragraph 69 (CDPHE carrying out CERCLA authority).

Subpart D. Disputes Regarding Budget and Work Planning

204. After EPA and CDPHE re-establish the regulatory milestones for FY and FY+1, or establish regulatory milestones for FY+2 or beyond, if DOE disagrees with any part of their position, any Party may, upon determining that consensus is not likely to be reached, initiate dispute resolution by providing notice to the other Parties. Disputes regarding regulatory milestones for FY and FY+1 shall be raised during the consultative process described in paragraph 146.c. Disputes regarding regulatory milestones for FY+2 or beyond shall be raised during the consultative process described in paragraph 147.b. Within seven days of such notice, the Project Coordinators in consultation with the DRC shall prepare a Written Notice of Dispute regarding those portions of regulatory milestones for FY, FY+1, or FY+2 or beyond, as appropriate, for which the Parties were not able to reach a consensus. Upon completion of the Written Notice of Dispute, the DRC shall forward it along with any supporting information to the SEC. The SEC shall have 14 days to attempt to resolve the dispute. If it is unable to resolve the dispute in this time, EPA and CDPHE shall issue a written decision establishing the regulatory milestones for FY, FY+1, or FY+2 or beyond, as appropriate. DOE may, consistent with paragraphs 196 and 197, elevate any disputed aspects of this decision to the Administrator or the Governor or their designees for their resolution.

205. If EPA and CDPHE determine that they are unlikely to reach agreement regarding some or all revisions to the regulatory milestones for FY and FY+1, or establishment of regulatory milestones for FY+2 or beyond, either one may initiate State-EPA dispute resolution by providing notice to the other Parties, local elected officials, and to the Rocky Flats Citizens Advisory Board (CAB) Site-Wide Issues Committee. Disputes regarding regulatory milestones for FY and FY+1 shall be raised during the consultative process described in paragraph 146.c. Disputes regarding regulatory milestones for FY+2 or beyond shall be raised during the consultative process described in paragraph 147.b. Within seven days of such notice, CDPHE and EPA Project Coordinators, in consultation with the State-EPA Dispute Resolution Committee

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(SEDRC), shall prepare a Written Notice of Dispute regarding those portions of the regulatory milestones for FY and FY+1, or FY+2 or beyond, as appropriate, on which the two Parties were not able to reach agreement. Upon completion of the Written Notice of Dispute, the SEDRC shall forward it, along with any supporting information, to the SESEC and to the CAB Site-Wide Issues Committee. The SESEC shall attempt to resolve the dispute within 14 days of receipt of the notice. If the SESEC is unable to resolve the dispute within this time period, the CDPHE and EPA members of the SESEC shall each prepare a proposed resolution of the dispute describing proposed regulatory milestones for FY and FY+1, or FY+2 or beyond, as appropriate. The SESEC shall submit the proposed resolutions of the dispute to the CAB Site-Wide Issues Committee no later than five days after the end of the 14 day period.

206. After receipt of these proposed resolutions, the CAB Site-Wide Issues Committee may make a recommendation to the CAB. The CAB may act upon this recommendation at its next meeting. Any recommendation approved by the CAB shall not be considered binding on CDPHE or EPA. CDPHE and EPA shall have five days from receipt of the CAB recommendation to reach agreement on regulatory milestones for FY, FY+1, or FY+2 or beyond. If they are unable to reach agreement, the existing regulatory milestones for FY and FY+1 shall continue in effect, and the existing FY+2 baseline shall be used to develop the FY+2 budget. Upon resolution of any dispute pursuant to this paragraph, the SESEC shall explain to the CAB in writing how the dispute was resolved, and how this result related to the CAB's recommendation.

Subpart E. Disputes Regarding Site-Wide Issues

207. Resolution of disputes between CDPHE and EPA under this Agreement regarding Site-Wide issues shall be resolved as described in this Subpart. Site-Wide issues shall be defined as:

- a. Draft permit modifications for CADs/CERCLA Proposed plans
- b. CADs/RODs
- c. Updates to the Environmental Restoration Ranking
- d. Updates to the IGD
- e. Future RSOPs for Activities Regulated under this Agreement that are related to more than one OU
- f. Treatment Systems that will treat wastes from both the Industrial Area and the Buffer Zone
- g. Treatability Study reports for activities that are related to more than one OU
- h. Integrated Water Management Plan
- i. Integrated Monitoring Plan
- j. Updates to the Community Relations Plan
- k. Updates to the HRR
- l. Change of a regulatory milestone
- m. Stop work orders related to Site-Wide issues
- n. Response actions that conflict with a regulator's statute
- o. Changes of regulatory milestones due to permit problems
- p. Site-Wide documents

EPA may also dispute CDPHE's decision regarding any retrievable, monitored waste storage or disposal facility described in paragraph 80, within 15 days of the issuance of any such decision.

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208. If the Project Coordinator for any Party determines that the regulators are not likely to reach consensus on a Site-Wide issue, he or she, in consultation with his or her agency's SEDRC representative, shall submit to the SEDRC a Written Statement of Dispute setting forth the nature of the dispute, the disputing party's position with respect to the dispute, and the information relied upon to support its position. Receipt of the Written Statement of Dispute, along with any supporting documents, by the SEDRC shall constitute formal elevation of the dispute in question to the SEDRC. At such time as the disputing party submits a statement of dispute to the SEDRC, a copy shall be sent to DOE.

209. Following elevation of a dispute to the SEDRC, the SEDRC shall have 21 days to reach a consensus resolution. CDPHE and EPA SEDRC representatives shall jointly sign a written statement of any consensus resolution and provide a copy to DOE. If the SEDRC is unable to reach a consensus resolution, CDPHE and EPA members shall forward pertinent information and their respective recommendations to the SESEC for resolution.

210. The SESEC members shall, as appropriate, confer, meet, and exert their best efforts to resolve the dispute. The SESEC shall have 21 days to reach a consensus resolution. CDPHE and EPA SESEC representatives shall jointly sign a written statement of any consensus resolution and provide a copy to DOE.

211. If the SESEC does not reach a consensus resolution within 21 days, EPA or CDPHE may issue a written notice elevating the dispute to the Administrator of EPA and the Governor or his designee for resolution. The Administrator, the Governor, and the Secretary of Energy or their respective designees, shall, as appropriate, confer, meet, and exert their best efforts to resolve the dispute and issue a written decision.

212. If any State-EPA dispute is not resolved pursuant to this Part, such disputes shall be subject to Part 18 (Reservation of Rights).

Subpart F. Disputes Regarding Overall Direction of Proposed Work

213. This Subpart provides a mechanism to prevent expenditure of resources on proposed work that appears likely would ultimately be disapproved by the appropriate regulator.

214. If, during the scoping phase of any proposed work, (e.g., prior to preparation of a draft decision document) or, based on a field modification required by the LRA, the Project Coordinators cannot concur with the overall direction of the proposed work, either Project Coordinator may invoke dispute resolution, and may issue a stop work order. Following the issuance of a stop work order under this Part, DOE performance of activities related to the proposed work that is the subject of the dispute may subject it to enforcement action by the LRA.

215. In attempting to resolve the dispute, the DRC or SEC should consider a number of options, including the possibility of conducting limited work that could inform a subsequent decision on whether to proceed or terminate the disputed work.

Disputes invoked under this Subpart shall follow the procedures described in paragraphs 192-195, except as follows:

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- a. the Written Notice of Dispute shall be prepared by the LRA Project Coordinator in consultation with the other Project Coordinators; and
- b. there shall be no appeal of a decision by the LRA's SEC representative, although the disputed matter may be raised in a dispute of a subsequent decision.

PART 16 ENFORCEABILITY

217. Notwithstanding the terms of this Part, any failure by DOE to meet any regulatory milestone contained in this Agreement may give rise to the assessment of stipulated penalties by EPA or CDPHE, in accordance with Part 17 (Stipulated Penalties). The provisions of this Part shall apply consistent with the provisions of Part 17 (Stipulated Penalties).
218. The Parties agree that all Parties shall have the right to enforce the requirements of this Agreement.
219. All requirements of this Agreement shall be enforceable by any person, including the State, pursuant to sections 310(c) and 113(h)(4) of CERCLA, and any violation of such requirements of this Agreement will be subject to civil penalties under sections 109 and 310(c) of CERCLA. DOE agrees that the State and any of its agencies are "persons" within the meaning of section 310 of CERCLA.
220. Requirements of this Agreement that are requirements of RCRA and CHWA shall be enforceable by any person, including the State, pursuant to any rights existing under section 7002(a)(1)(A) of RCRA. DOE agrees that the State and any of its agencies are "persons" within the meaning of section 7002(a) of RCRA. Nothing in this paragraph shall be construed as contravening CERCLA § 113(h).
221. Requirements of this Agreement that relate to RCRA or CHWA may be enforced by CDPHE as requirements of a Compliance Order on Consent issued pursuant to § 25-15-308, C.R.S.
222. Requirements of State environmental permits issued for activities regulated under this Agreement may be enforced through the State's normal enforcement mechanisms.
223. In the event CDPHE determines that DOE's failure to meet any regulatory milestones under this Agreement was due to a lack of funding, it is CDPHE's intention not to seek or assess any penalties (stipulated or otherwise) for such violations, provided that: (Budget and Work Planning):
 - a. DOE used its best efforts to obtain funding necessary to achieve the affected milestone(s) as provided in Part 11;
 - b. the President's budget requested sufficient funding to accomplish the proposed program identified in paragraph 147.d;

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- c. DOE-HQ allotted the insufficient funding for the affected EM program(s) consistently with the approach described in the Final Report of the Federal Facility Environmental Restoration Dialogue Committee, or another approach deemed acceptable by CDPHE; and
- d. DOE made a good faith effort to comply with the milestones, as provided in Part 11, notwithstanding the lack of sufficient funding.

Nothing in this paragraph shall preclude CDPHE from taking other enforcement action seeking or imposing relief of an injunctive nature.

PART 17 STIPULATED PENALTIES

224. In the event that DOE fails to meet any regulatory milestone in accordance with the requirements of this Agreement, EPA and/or CDPHE may assess a stipulated penalty against DOE, pursuant to the provisions of this Part. If EPA and CDPHE both assess a stipulated penalty for the same violation, the combined assessments shall not exceed the amounts specified in the following paragraph. Stipulated penalties will accrue from the date of the missed milestone or the date the non-compliance occurs. In no event shall this Part give rise to a stipulated penalty for each missed regulatory milestone in excess of the statutory limits set forth in § 109 of CERCLA.
225. DOE's liability for stipulated penalties for missed regulatory milestones will accrue at the following rates:
- a. \$20,000 per week for each regulatory milestone designated as "first tier." First tier regulatory milestones shall be limited to no more than six per fiscal year, and shall reflect end-points for major projects.
 - b. \$5,000 per week for each regulatory milestone designated as "second tier." Second tier regulatory milestones may reflect beginning points for multi-year projects or end-points in addition to those designated as "first tier" regulatory milestones.
226. Violations of regulatory milestones that run for part of a week shall be subject to the stipulated penalties set forth in the preceding paragraph, prorated for the number of days of violations. Accordingly, violations of "first tier" regulatory milestones shall be subject to stipulated penalties of \$2,857 per day; violations of "second tier" regulatory milestones shall be subject to stipulated penalties of \$714 per day.
227. Before final settlement of any assessment of stipulated penalties, the Parties will strive to reach agreement for preserving the use of penalty funds at the Site. Nevertheless, the regulators shall retain the ultimate authority for directing the disposition of the penalty funds.
228. Upon determining that DOE has failed to meet a regulatory milestone, the agency assessing a stipulated penalty shall so notify DOE in writing of the failure within 4 weeks of the first date of non-compliance. If the failure in question is not already subject to dispute resolution at the time such notice is received, DOE shall have 15 days after receipt of the notice to invoke the dispute resolution provisions of Subpart 15B on the questions of whether the failure did in fact occur, the number of days of violation, or, provided the conditions of Part 13, paragraph 174

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are met, should be excused, in whole or in part, on the basis of force majeure. Within this same time frame, DOE may also submit any information for the regulators' consideration in assessing a penalty under this Part. Upon DOE's request, this information will be discussed at an informal conference prior to any assessment of the penalty. DOE shall not dispute the accrual rate for stipulated penalties assessed under this Part. EPA or CDPHE may exercise discretion regarding the amount of accrued stipulated penalties to be assessed within a specific period of violation. DOE shall not dispute EPA's or CDPHE's decision regarding the amount of the accrued penalty to be assessed. No assessment of a stipulated penalty shall be final until the conclusion of any dispute resolution procedures related to the assessment of the stipulated penalty. Stipulated penalties shall continue to accrue during any dispute resolution process, but DOE will not be obligated to pay until the dispute is resolved. DOE shall not be liable for the stipulated penalty assessed if the failure is determined, through the dispute resolution process, not to have occurred, or to be excused due to the occurrence of a force majeure.

229. Any stipulated penalty assessed by the EPA shall be payable to the Hazardous Substances Response Trust Fund from funds authorized and appropriated for that purpose. Any stipulated penalty assessed by CDPHE shall be payable to the General Fund of the State of Colorado. The Parties recognize that stipulated penalties assessed by CDPHE are done so pursuant to the State's CHWA authority and RCRA section 6001, 42 U.S.C. § 6961, and not pursuant to CERCLA.

230. DOE shall pay stipulated penalties assessed by CDPHE under this Part within 120 days, unless CDPHE agrees to a longer schedule. DOE shall request, for stipulated penalties assessed by the EPA, specific authorization and appropriation to pay such penalty in its budget submittal for FY+1, unless DOE has already submitted its final budget for that budget year to OMB, in which case DOE shall request such specific authorization and appropriation in its FY+2 budget submittal.

231. Nothing in this Part shall preclude the EPA or CDPHE from pursuing any other sanction that may be available to them for DOE's failure to meet any regulatory milestone in accordance with the requirements of this Agreement in lieu of assessing stipulated penalties. Nor shall anything in this Part preclude EPA or CDPHE from seeking or imposing any injunctive relief that may be available to them to compel DOE to remedy any failure to meet any regulatory milestone in accordance with the requirements of this Agreement. Assessment of a stipulated penalty by EPA and CDPHE shall preclude EPA and CDPHE from seeking to also impose a statutory penalty for failure to meet the same regulatory milestone. The EPA and CDPHE agree to not seek sanctions against DOE outside of this Agreement for those matters which are subject to a dispute under this Agreement, during the pendency of the dispute resolution process. Assessment of a stipulated penalty by CDPHE under this Part shall preclude CDPHE from seeking to impose additional penalties against DOE for failure to meet the same regulatory milestone under both this Agreement and a CHWA permit. Assessment of a stipulated penalty by CDPHE under this Part shall not preclude CDPHE from seeking to impose penalties against DOE's contractors for failure to meet the same regulatory milestone under the CHWA permit; provided, however, that in such a case, if the contractor seeks reimbursement of the penalty assessed against it as an allowable cost and the DOE contracting officer allows the request, the penalty assessment against the contractor shall be vacated.

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232. Nothing in this Part shall preclude EPA or the State from taking any enforcement action available to either of them for any violation of a requirement of this Agreement other than a regulatory milestone.

233. DOE-RFFO shall provide a copy of the annual reports required by § 120(e)(5) of CERCLA to EPA and CDPHE.

234. Nothing in this Agreement shall be construed to render any officer or employee of DOE personally liable for the payment of any stipulated penalty assessed pursuant to this Part.

PART 18 RESERVATION OF RIGHTS

235. If CDPHE and EPA are unable to resolve any dispute arising under this Agreement after utilizing the appropriate dispute resolution procedures, then each agency reserves its rights to impose its requirements directly on DOE, to defend the basis for those requirements, and to challenge any conflicting requirements imposed by the other regulatory agency.

236. The Parties each reserve any rights they may have to seek judicial review of a proposed decision or action taken with respect to any response actions at any given unit on the grounds that such proposed decision or action conflicts with its respective laws governing protection of human health and/or the environment. EPA and CDPHE agree to utilize the dispute resolution procedures contained in Subpart 15E prior to seeking such judicial review. It is the understanding of the Parties that this reservation is intended to provide for challenges where the adequacy of protection of human health and the environment or the means of achieving such protection is at issue. Notwithstanding the foregoing, the SRA may not challenge a decision by the LRA (except for Site-Wide issues).

237. Nothing in this Agreement shall be interpreted to affect EPA's authority under CERCLA to impose requirements necessary to protect public health and the environment. Where CDPHE is the LRA, the EPA DRC member shall consult with the CDPHE DRC member prior to EPA's exercise of this authority.

238. The Parties have determined that the activities to be performed under this Agreement are in the public interest. Except as provided in paragraph 242, EPA and CDPHE agree that compliance with this Agreement shall stand in lieu of any administrative and judicial remedies against DOE or its present or future contractors that are available to EPA and CDPHE regarding the currently known releases or threatened releases of hazardous substances, hazardous wastes, pollutants, hazardous constituents, or contaminants at the Site that are the subject of the activities being performed by DOE under this Agreement. However, nothing in this Agreement shall preclude EPA or the State from exercising any administrative or judicial remedies available to them under the following circumstances:

- a. in the event or upon the discovery of a violation of, or noncompliance with, any provision of RCRA or CHWA, including any discharge or release of hazardous waste or hazardous constituents that is not addressed in the baseline or subsequent Work Description Documents;

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- b. upon discovery of new information regarding hazardous substances or hazardous waste management including, but not limited to, information regarding releases of hazardous waste, hazardous constituents, or hazardous substances that are not addressed in the baseline or subsequent Work Description Documents; or
- c. upon CDPHE's or EPA's determination that such action is necessary to abate an imminent and substantial endangerment to the public health, welfare, or the environment.

239. For matters within the scope of this Agreement, CDPHE and EPA reserve the right to bring any enforcement action against other potentially responsible Parties, including contractors, subcontractors and/or operators, if DOE fails to comply with this Agreement. For matters outside this Agreement, and any actions related to response costs, EPA and the State reserve the right to bring any enforcement action against other potentially responsible Parties, including DOE's contractors, subcontractors and/or operators, regardless of DOE's compliance with this Agreement.

240. This Agreement shall not be construed to limit in any way any rights that may be available by law to any citizen to obtain information about the work under this Agreement or to sue or intervene in any action to enforce State or federal law.

241. Except as provided in paragraph 238, DOE is not released from any liability or obligation which it may have pursuant to any provisions of State and federal law, nor does DOE waive any rights it may have under such law to defend any enforcement actions against it.

242. DOE is not released from any claim for damages for injury to, destruction of, or loss of natural resources pursuant to section 107 of CERCLA.

243. EPA and the State reserve all rights to take any legal or response action for any matter not specifically part of the activities regulated under this Agreement.

244. Nothing in this Agreement shall be interpreted to affect EPA's responsibility for oversight of CDPHE's exercise of its authorized RCRA authorities. In carrying out any such oversight, EPA shall follow the statutory and regulatory procedures, EPA policies, any State-EPA MOU describing how EPA shall exercise its RCRA oversight responsibilities, and the provisions of this Agreement.

245. Nothing in this Agreement shall be construed to affect any criminal investigations or criminal liability of any person(s) for activities at RFETS.

246. Notwithstanding this Part or any other part of this Agreement, the State reserves any rights it may have to seek judicial review of a Site-Wide or final remedial action in accordance with sections 113, 121 and 310 of CERCLA, 42 U.S.C. §§ 9613, 9621 and 9659, but agrees to exhaust the dispute resolution process in Part 15 prior to seeking judicial review.

247. The State also reserves any rights it may have to seek judicial review of any ARAR determination made at the time of final remedy selection for an OU in accordance with sections 121 and 310 of CERCLA.

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248. The Parties each reserve their rights to challenge any decision regarding final remedy selection at any OU under all applicable laws.

249. The Parties agree that in any administrative or judicial proceeding seeking to enforce the requirements of this Agreement, the DOE may raise as a defense that any failure or delay was caused by the unavailability of appropriated funds. In particular, nothing herein shall be construed as precluding DOE from arguing either that the unavailability of appropriated funds constitutes a force majeure, or that no provisions of this Agreement or Order shall be interpreted to require the obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. §§ 1301 or 1341, or the Atomic Energy Act, 42 U.S.C. § 2201. While the State disagrees that an Anti-Deficiency Act defense, or any other defense based on lack of funding exists, the Parties do agree and stipulate that it is premature at this time to raise and adjudicate the existence of such a defense.

250. Nothing in this Agreement shall constitute an admission by any Party regarding the existence of CERCLA jurisdiction arising from DOE's failure to accomplish a target activity identified in Appendix 6.

251. Consistent with paragraph 26, in the event of any administrative or judicial action by the State or EPA, all Parties reserve all rights, claims, and defenses available under the law.

PART 19 AMENDMENT OF AGREEMENT

52. Except as provided in paragraph 287 (termination by State), the body of this Agreement (i.e., pages 1-84) may only be amended by mutual agreement of the Parties. Such amendments shall be in writing and shall have as their effective date the date on which they are signed by all Parties, unless otherwise agreed, and shall be incorporated into this Agreement by reference. Any Party may request that a proposed amendment be submitted for public comment. Any dispute as to the need for the proposed amendment shall be resolved pursuant to Part 15B (Resolution of Disputes) of this Agreement. Should the Parties determine that an amendment to this Agreement is necessary, and the amendment would affect a State environmental permit for the Site, CDPHE shall initiate appropriate permit modification procedures for that permit in accordance with its regulations.

253. Notwithstanding paragraph 252, approval of, or changes to, any Attachment or any document required to be submitted and approved pursuant to Part 9 (Review and Approval of Documents and Work) do not constitute amendments to this Agreement under this Part.

PART 20 PERIODIC REVIEW

254. The EPA and CDPHE will, pursuant to CERCLA section 121(c), review any remedial action associated with any final ROD that results in any hazardous substances, pollutants, or contaminants remaining on-site, no less often than every five years after the initiation of such final remedial action to assure that human health and the environment are being protected by the remedial action being implemented. To the extent that remedies have incorporated institutional controls, EPA shall review the continuing effectiveness of such controls, and shall evaluate whether additional remedial action could be taken that would reduce the need to rely on

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institutional controls. In making such an evaluation, EPA shall consider all relevant factors, including advances in technology and the availability of funds. If upon such review EPA finds that further remedial action by DOE is warranted to assure the protection of human health and the environment, DOE shall, consistent with sections 104 and 106 of CERCLA, implement remedial actions necessary to abate any release or threat of a release of a hazardous substance. The Parties agree that Part 19, shall not be construed as a limitation on the requirement for further remedial actions which might be required as a result of the five-year review mandated by CERCLA section 121(c). Part 10 shall be used to incorporate any requirement for further remedial actions.

255. Any dispute by DOE or CDPHE of the determination under paragraph 254 shall be resolved under Subpart 15C.
256. The Parties recognize that, even with the efforts in this Agreement to streamline and coordinate regulatory processes, implementation of this Agreement still involves multiple regulators and the coordination of many environmental laws and regulations. The success of this Agreement will depend, in large measure, on the good faith implementation of the consultative approach described in Part 7. The Parties agree to abide by the "Principles for Effective Dialogue and Communication at Rocky Flats," Appendix 2 of this Agreement. Consistent with these Principles, the Parties will endeavor to be reasonable in interpreting and applying applicable State and Federal environmental requirements.
257. The Parties shall assess the implementation of this Agreement every two years with the first assessment being conducted no later than the second anniversary date of the execution of this Agreement. In this assessment, the Parties shall conduct a review of the substantive and procedural requirements of this Agreement, including but not limited to the regulatory approach set forth in Part 8, to determine what measures each Party will take to ensure effective implementation of this Agreement. Such measures may include reallocation of resources, internal reorganization, revised procedures for consultation or internal coordination, and additional training of appropriate staff.
258. Any Party may propose an amendment to this Agreement pursuant to Part 19 when that Party believes its concerns regarding the effective implementation of this Agreement have not been adequately addressed through measures of the sort described in the preceding paragraph. The Party proposing an amendment to this Agreement under this Part shall provide a written analysis setting forth the basis for the proposed amendment to the other Parties.
259. If any Party rejects a proposed amendment under this Part, such rejection shall be subject to Part 15, including paragraphs 190 and 196-197 for any disputes that are nationally significant.
260. Amendments negotiated and approved by the Parties under this Part shall follow Part 19 for subsequent incorporation into the Agreement and, if necessary, applicable permits required by State environmental laws.
261. Pending the outcome of such negotiations and any dispute associated with negotiations under this Part, all portions of the Agreement shall remain effective, including Part 8, all regulatory milestones and all other requirements of this Agreement.

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1 PART 21 REPORTING

262. The Parties' Project Coordinators will meet at least monthly to discuss the implementation of this Agreement. The purpose of these meetings will be to identify accomplishments, work in progress and anticipated work, potential changes to the baseline, implementation difficulties, compliance issues, opportunities for streamlining, and other matters of importance to the successful implementation of this Agreement. Each Party will provide the others with agenda issues at least two business days in advance of the meeting.

263. Quarterly, DOE will provide EPA and CDPHE with a Progress Report that describes the progress toward implementation of the activities covered by this Agreement. It is the Parties' intention, insofar as possible, to use existing reports and databases to fulfill this reporting requirement. Upon request, DOE will provide EPA and/or CDPHE with copies (or portions thereof) of the EM Progress Tracking System or equivalent report on a monthly basis.

16 PART 22 NOTIFICATION

264. Any report, document, or submittal provided to EPA and CDPHE pursuant to a schedule identified in or developed under this Agreement shall be hand delivered, sent certified mail, return receipt requested, or delivered by any other method that verifies receipt by the intended recipient. Such reports, documents, or submittals shall be delivered to the addresses listed in Attachment 11. Documents sent to DOE shall be sent to the address listed in Attachment 11. Documents must be sent to the designated addresses in a manner designed to be received by the date due, unless otherwise specified by the Parties.

265. Unless otherwise requested, all routine correspondence may be sent via regular mail.

28 PART 23 SAMPLING AND DATA/DOCUMENT AVAILABILITY

266. It is the goal of the Parties to develop and maintain an effective and efficient monitoring system for RFETS. This system includes both the monitoring programs conducted by DOE, CDPHE and the cities of Broomfield and Westminster, and data management systems. The monitoring system shall provide information for operating and remediating the Site, assuring public safety, and informing the public about discharges and emissions from RFETS. The system will minimize duplicative efforts. The long range goal is to integrate all environmental and natural resource monitoring.

267. In consultation with CDPHE and EPA, DOE shall establish an Integrated Monitoring Plan (IMP) that effectively collects and reports the data required to ensure the protection of human health and the environment consistent with the Preamble, compliance with this Agreement, laws and regulation, and the effective management of RFETS's resources. The IMP will be jointly evaluated for adequacy on an annual basis, based on previous monitoring results, changed conditions, planned activities and public input. Changes to the IMP will be made with the approval of EPA and CDPHE. Disagreements regarding any modifications to the IMP will be subject to the dispute resolution process described in Subpart 15B or E, as appropriate.

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268. All Parties shall make available to each other and the public results of sampling, tests, or other data with respect to the implementation of this Agreement as specified in the IMP or appropriate sampling and analysis plan. If quality assurance is not completed within the time frames specified in the IMP or appropriate sampling and analysis plan, raw data or results shall be submitted upon the request of EPA or CDPHE. In addition, quality assured data or results shall be submitted as soon as they become available.

269. Consistent with Part 30 (Classified and Confidential Information), DOE shall permit EPA, CDPHE, or their authorized representatives to inspect and copy, at reasonable times, all records, files, photographs, documents, and other writing, including sampling and monitoring data, pertaining to work undertaken pursuant to this Agreement.

270. By the end of FY 1996, the Parties will establish a mutually agreed-upon mechanism to exchange verified and validated monitoring data between the Parties and the cities of Westminster and Broomfield in a timely and efficient manner.

PART 24 RETENTION OF RECORDS

271. DOE shall preserve all agency records and documents in its possession or in the possession of its employees, agents, contractors or subcontractors which relate in any way to the presence of hazardous substances, pollutants, and contaminants at the Site for the duration of this Agreement or for a term consistent with the longest duration required by the NCP, RCRA, CHWA, or the DOE records retention schedules then in effect at the termination of this Agreement. DOE retention schedules are developed in accordance with the National Archives and Records Administration records management handbook, Disposition of Federal Records (NSN 7610-01-055-8704). All such records and documents so retained shall be proposed for permanent retention in accordance with 36 CFR 1228.28(b). DOE shall make all such records or documents available to CDPHE and the EPA upon request.

PART 25 ACCESS

272. Without limitation on any authority conferred on EPA or CDPHE by statute, regulation, court order, or agreement, EPA, CDPHE, and/or their authorized representatives, with proper safety and security clearances, shall have authority to enter RFETS at all reasonable times, with or without advance notification for the purposes of, among other things:

- a. inspecting records, operating logs, contracts, and other documents directly related to implementation of this Agreement;
- b. reviewing the progress of DOE or its contractors in implementing this Agreement;
- c. conducting such tests as the EPA or State Project Coordinator deems necessary; or
- d. verifying the data submitted to EPA and/or CDPHE by DOE.

Nothing in this paragraph shall be construed as a waiver of the attorney-client privilege.

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273. DOE shall honor all requests for such access by EPA or CDPHE, conditioned only upon presentation of proper credentials and conformance with RFETS security and safety requirements. The latter may include dosimetry devices, training on RFETS safety features (such as alarms, barriers, and postings), and advance fittings for clothing and respiratory equipment as ordinarily required. Escorts to restricted areas shall be assigned expeditiously by the appropriate Assistant Manager, RFFO.

274. To the extent that this Agreement compels access to property not owned by DOE (Third Party Property), DOE shall, to the extent of its authority including CERCLA § 104, and taking all appropriate administrative and judicial actions, obtain access to Third Party Property for the Parties, their agents and their contractors. DOE shall use its best efforts with the Third Party Property owner to enter into a limited non-exclusive agreement (e.g., license or easement) to allow the Parties, their agents and their contractors to enter upon the Third Party Property to perform work required under this Agreement. DOE shall also use its best efforts to ensure that the non-exclusive agreement runs with the land, and binds and inures to the benefit of the Parties, their successors and their assigns.

275. If DOE is unable to obtain a non-exclusive agreement that runs with the land, DOE may enter into any other type of agreement that grants access to the Third Party Property for the Parties, their agents and their contractors. Any access agreement that does not run with the land must provide for (1) the continuation of any work required under this Agreement in the event the Third Party Property owner transfers an interest in or otherwise encumbers the Third Party Property; and (2) a thirty day written notice, sent by certified mail, to the EPA, CDPHE and DOE prior to the Third Party Property owner's transferring an interest in or otherwise encumbering the Third Party Property. DOE shall not enter into any access agreement that provides conditional access to the EPA or CDPHE without EPA's and CDPHE's prior consent. The EPA's or CDPHE's refusal to approve a conditional access agreement shall constitute a denial of access to the Third Party Property.

276. If, after having taken reasonable steps to do so, DOE is unable to obtain a non-exclusive access agreement from a Third Party Property owner, the EPA shall assist DOE in obtaining access to the Third Party Property. If necessary, DOE shall also request that the Department of Justice (DOJ) seek a court order to obtain access to the Third Party Property for the Parties, their agents and their contractors. EPA's assistance shall include the EPA's support in requesting that DOJ seek a court order to gain access to the Third Party Property.

277. In the event that the Parties agree that they have failed to obtain access to Third Party Property, notwithstanding their pursuit of all reasonable means as described in the preceding paragraphs of this Part, DOE shall submit appropriate changes to approved work under this Agreement within 15 days of such agreement.

PART 26 TRANSFER OF REAL PROPERTY

278. No lease or conveyance of title, easement, or other interest in the real property at RFETS on which any containment system, treatment system, monitoring system, or other response action(s) is installed or implemented pursuant to this Agreement shall be consummated by DOE without provision for continued maintenance of any such system or other response action(s). At least

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30 days prior to any conveyance, DOE shall notify EPA and CDPHE of the provisions made for the continued operation and maintenance of any response action(s) or system installed or implemented pursuant to this Agreement. DOE shall also comply with the provisions of section 120(h) of CERCLA regarding any conveyance of title at RFETS and any applicable law or regulation governing the disposal of real property owned by the United States.

279. DOE's current mission for RFETS presents the possibility that title to portions or all of RFETS may be conveyed to other parties. DOE shall comply with the provisions of the Community Environmental Response Facilitation Act (CERFA), 42 U.S.C § 9620(h)(4) and applicable law regarding any lease. DOE shall perform the required assessments in order to identify all uncontaminated real property at RFETS. The results of these assessments shall be provided to the Regional Administrator of EPA Region VIII by DOE for the Regional Administrator's review and concurrence, and to the public. Upon the sale or other transfer of property identified as uncontaminated, DOE shall record in any related documents any covenants required by CERFA.

280. Decision documents shall require institutional controls as necessary to protect human health and the environment. Any transfer of real property shall be subject to any such institutional controls.

PART 27 PARTICIPATION BY LOCAL ELECTED OFFICIALS AND THE PUBLIC/ADMINISTRATIVE RECORD

281. As required by the IAG, DOE developed and implemented a Community Relations Plan (CRP) which responded to the need for an interactive relationship with all interested community elements in the Rocky Flats area. The plan was based on community meetings and other relevant information including public comments received on the IAG. The CRP addressed activities and elements of work being undertaken by DOE. DOE agreed to develop and implement the CRP in a manner consistent with sections 113(k) and 117 of CERCLA, 42 U.S.C. §§ 9313(k) and 9617, relevant community relations provisions of the NCP, EPA policy and guidance (including but not limited to EPA OSWER Directive 2903.03C, Community Relations in Superfund: A Handbook, January, 1992, and any modifications thereto), DOE policy and guidance, State statutes, regulations, and guidance identified in the CRP. All Parties recognize the need to review and revise the CRP in light of DOE's new mission and the finalization of this Agreement. Therefore, DOE shall develop, in consultation with CDPHE and EPA, a revised CRP, to be titled the "Rocky Flats Site-Wide Integrated Public Involvement Plan." This plan will adhere to the following principles and guidelines:

- a. ongoing consultation with local elected officials, local government managers, RFLII, CAB, other groups and citizens;
- b. public involvement will be integrated to assure consistency with RFETS' long-term vision, mission and budget;
- c. public involvement at RFETS will be tied clearly to the decision-making process;
- d. public involvement at RFETS will meet state and federal legal requirements;
- e. public involvement will be pursued for input to significant public policy issues, even if there is no legal requirement for involvement;
- f. the public involvement approach will recognize the needs for participation by various and diverse community groups and people with varying levels of knowledge and understanding of RFETS issues;

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- g. public involvement achievements, and the Integrated Public Involvement Plan, will be reviewed at least annually by DOE in consultation with the relevant agencies and by stakeholder groups for applicability to and viability under current circumstances at RFETS; and
- h. public involvement will include activities which are informational and/or educational in nature in accordance with the needs of the decision-makers and the stakeholders.

282. Except in case of an emergency or the need for the public to receive information immediately, any Party issuing a press release to the media regarding any of the work required by this Agreement shall advise the other Parties of the nature of the press release at least two business days before the issuance of such press release and of any subsequent changes prior to release. In the case of an emergency or the need for the public to obtain the information immediately, the Parties shall provide such notice as soon as practicable.

283. DOE established and is maintaining Administrative Record files for CERCLA response actions at or near the Site in accordance with section 113(k) of CERCLA. The Administrative Record file and resultant Administrative Record shall be established and maintained in accordance with EPA policy and guidelines. Any future changes to these policies and guidelines affecting DOE's maintenance of the Administrative Record file shall be discussed by the Parties and an agreement will be reached on how best to accommodate those changes. DOE shall maintain the master copy of the Administrative Record file at or near RFETS. The Administrative Record file and final Administrative Records shall be established and maintained by DOE after EPA and State approval. There are four Information Repository locations for the public to view information copies of the Administrative Record files. The repository copies of the Administrative Record files may be supplied in microfilm, electronic format, optical format, or any other format or media which will allow access to a reasonable facsimile of the original documents. Each repository will also house equipment to facilitate the viewing and reproducing documents contained in the Administrative Record files. These repositories are listed in Attachment 7. At least one copy of the Administrative Record shall be accessible to the public at times other than normal business hours.

284. The Administrative Record files shall be established and maintained for each OU and for sitewide activities. The Administrative Record shall be updated by DOE at least annually. An index of documents in the complete Administrative Record files will accompany each update to the Administrative Record files. Documentation on issues giving rise to decisions from dispute resolution procedures of Part 15, and decisions themselves, shall be included in the Administrative Record files.

285. EPA, after consultation with CDPHE when necessary, shall make the final determination of whether a document is appropriate for inclusion in an Administrative Record. EPA and CDPHE shall participate in compiling the Administrative Records by submitting documents to DOE as EPA and CDPHE deem appropriate. DOE shall include these documents in the Administrative Record files. Every Administrative Record file will be reviewed by DOE, EPA, and CDPHE before the file is closed at the signing of the appropriate decision document.

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PART 28 DURATION/TERMINATION

286. Within 60 days after the Federal Register notice that removes the Site from the NPL, all Parties shall commence negotiations for appropriate modification of this Agreement which considers among other things the continuing requirements of any CAD/RODs being implemented at the site at that time.

287. CDPHE may, in its sole discretion, terminate this Agreement upon 60 days' written notice to the other Parties. Termination of the Agreement by CDPHE shall be effective on the 60th day after such notice, unless CDPHE agrees otherwise in writing before such date. Once termination is effective pursuant to this paragraph, this Agreement shall have no further force or effect, except that the regulatory milestones and any decisions made by EPA that have become requirements of this Agreement shall remain enforceable as requirements of a CERCLA § 120 Interagency Agreement between EPA and DOE.

PART 29 SEVERABILITY

288. If any provision of this Agreement is ruled invalid, illegal, unconstitutional, or unenforceable, the remainder of the Agreement shall not be affected by such ruling.

PART 30 CLASSIFIED AND CONFIDENTIAL INFORMATION

289. Notwithstanding any provision of this Agreement, all requirements of the AEA of 1954, as amended, and all Executive Orders concerning the handling of unclassified controlled nuclear information, restricted data, and national security information, including "need to know" requirements, shall be applicable to any access to information or facilities covered under the provisions of this Agreement. EPA and CDPHE reserve their right to seek to otherwise obtain access to such information or facilities if it is denied, in accordance with applicable law.

290. Any Party may assert on its own behalf, or on behalf of a contractor, subcontractor, or consultant, a claim of confidentiality or privilege covering all or any part of the information requested by this Agreement, pursuant to CERCLA section 104, 42 U.S.C. § 9604 and State law. Except as provided in the preceding paragraph, analytical data shall not be claimed as confidential. Parties are not required to provide legally privileged information. At the time any information is furnished which is claimed to be confidential, all Parties shall afford it the maximum protection allowed by law. If no claim of confidentiality accompanies the information, it may be made available to the public without further notice.

PART 31 RECOVERY OF STATE COSTS

291. DOE agrees to reimburse CDPHE for:

- a. all non-discriminatory state environmental fees or assessments; and
- b. CERCLA administrative or oversight activities incurred which specifically relate to the implementation of this Agreement at the Site, to the extent such costs are reasonable, not inconsistent with the NCP, and are not covered by permit fees and other assessments, or by any other agreement between the Parties.

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192. The amount and schedule of payment of these costs will be negotiated based on anticipated needs and in consideration of DOE's multi-year funding cycles. CDPHE reserves all rights it has to recover any other past and future costs in connection with CERCLA activities conducted at the Site. CDPHE shall annually provide DOE a written estimate of projected costs to be incurred in implementing this Agreement for the upcoming two fiscal years, no later than the end of the first quarter of each fiscal year. DOE and CDPHE may choose to enter into a grant or other mechanism to provide for payment of CDPHE's costs relating to the implementation of this Agreement, including any fees or other assessments that would otherwise be imposed under 6 CCR 1007-3, Part 100.3, 5 CCR 1001 (air quality), or (after delegation of the federal program for Rocky Flats) 5 CCR 1002 (water quality).

293. Unless DOE and CDPHE have entered into a grant or other reimbursement mechanism as described in the preceding paragraph, and DOE provides funding as specified in such grant or mechanism, DOE agrees to pay CDPHE, in full, and no later than 30 days after receipt of invoice, all document review fees and annual waste fees as required by 6 CCR 1007-3, Part 100.3, consistent with section 6001 of RCRA; 5 CCR 1001 (air quality fees); and 5 CCR 1002 (water quality fees). DOE may contest charges in accordance with the dispute resolution procedures of Subpart 15B. DOE recognizes that if it does not reimburse CDPHE for all of its costs relating to the implementation of this Agreement as specified above, CDPHE will be unable to meet the time frames specified for its activities in this Agreement, including the time specified to render a decision on a proposed PAM. In the event DOE does not reimburse CDPHE for all of its costs relating to the implementation of this Agreement as specified above, CDPHE is excused from the obligation to meet such time frames, and no proposed PAM shall be deemed approved by reason of CDPHE's failure to meet the time frame specified in this Agreement to render a decision on a proposed PAM.

PART 32 OTHER CLAIMS

294. Nothing in this Agreement shall constitute or be construed as a bar or release from any claim, cause of action, or demand in law or equity by or against any person, firm, partnership, or corporation, including any DOE or predecessor agency contractor, subcontractor, and/or operator, either past or present, for any liability it may have arising out of or relating in any way to the generation, storage, treatment, handling, transportation, release, or disposal of any hazardous substances, hazardous wastes, pollutants, or contaminants found at, taken to, or taken from the Site.

295. This Agreement does not constitute any decision on pre-authorization of funds under section 111(a)(2) of CERCLA, 42 U.S.C. § 9611(a)(2).

296. Neither EPA nor CDPHE shall be held as a party to any contract entered into by DOE to implement the requirements of this Agreement.

PART 33 EFFECTIVE DATE

The effective date of this Agreement shall be the date on which the last Party signs this Agreement.

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FINAL ROCKY FLATS CLEANUP AGREEMENT

PART 34 APPROVAL OF AGREEMENT

Each undersigned representative of a Party certifies that he or she is fully authorized to enter into this Agreement and to legally bind such Party to this Agreement.

Patti Shwayder, Executive Director
Colorado Department of Public Health and Environment

Alvin L. Alm, Assistant Secretary
for Environmental Management
U.S. Department of Energy

Jessie M. Roberson, Manager
Rocky Flats Field Office
U.S. Department of Energy

Jack W. McGraw, Acting Regional Administrator
Region 8, Environmental Protection Agency

July 19, 1996

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ATTACHMENT 1

OPERABLE UNIT CONSOLIDATION PLAN

Operable Unit Consolidation Plan

DOE, Kaiser-Hill, RMRS, CDPHE and EPA staffs developed the following proposal for Operable Unit (OU) consolidation during recent working sessions. These working sessions resulted in a recommendation to minimize the number of OUs for remediation and closure at the Site. This replaces the earlier proposal dated September 28, 1995 which was modified to incorporate the Rocky Flats Vision and other strategies, as well as to delineate the lead regulatory agency by area for the Site.

The primary benefit of consolidating OUs is the reduced process and administrative requirements. Coordinating the regulatory jurisdictional boundaries with the OU consolidation boundaries also eases the administrative management of the OUs. The resulting cost savings can be applied to environmental remediation or other higher priority tasks at RFETS. In addition, less time and resources will be spent generating and reviewing documents, and more time and resources can be spent on risk reduction. Consolidation will also facilitate a more integrated approach to Site-Wide planning which will include site-wide prioritized remediation.

In the consolidation process, the Working Group identified the logical stopping point for each OU. Stopping points were selected to maximize the utilization of work completed to date. The Working Group recommends continuation and implementation of the CAD/ROD process for those OUs which are nearing completion (OUs 1, 3, 5, 6 and 7). The following table summarizes the recommended stopping points for each OU.

Current OUs	Stopping Point for Work in Progress
OU 2	RFI/RI Report (completed)
OU 4	Draft IM/TRA for Solar Ponds (completed)
OUs 8, 9, 10, 12, 13 and 14	Draft data summaries (completed)
OUs 11, 15 and 16	RODs already completed

Contaminant types and distribution, impact on surrounding areas, future potential for contamination, future land uses, and water management requirements were considered in addition to stopping points for each OU in developing the consolidation strategy. Based on these considerations the existing operable units are proposed to be consolidated in the following manner:

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Proposed OUs	Consisting of	Lead Regulatory Agency
OU 1	Current OU 1 IHSSs	EPA
OU 3	Current OU 3 IHSSs	EPA
OU 5	Current OU 5 IHSSs except IHSSs 115 and 196 (Original Landfill) *	EPA
OU 6	Current OU 6 IHSSs except IHSSs 143 (Old Outfall) and 165 (Triangle Area) *	EPA
OU 7	Current OU 7 IHSSs	EPA
Industrial Area OU	All IHSSs from OUs 4, 8, 9, 12, 13, 14, IHSSs 115 and 196 from OU 5, and IHSSs 143 and 165 from OU 6, plus all OU 10 IHSSs except IHSSs 170, 174a and 174b (PU&D yard)	CDPHE
Buffer Zone OU	All IHSSs from OU 2, and IHSSs 170, 174a and 174b from OU 10,	EPA

* Affected IHSSs in OUs 5 and 6 will be identified on the OU Consolidation Map (Attachment 2).

CDPHE is the lead regulatory agency for the Industrial Area OU and the EPA is the lead regulatory agency for the Buffer Zone OU. Attachment 2 of RFCA shows the new OUs and the lead regulatory agency for each area.

Groundwater at the Site will be managed in an integrated fashion. The Working Group does not recommend that a separate operable unit be created for groundwater as closure is not anticipated in the near-term and the added resource costs of creating an OU do not outweigh the benefits.

ATTACHMENT 2

SITE MAP

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ATTACHMENT 3

RFETS INDIVIDUAL HAZARDOUS SUBSTANCE SITE (IHSS) LIST

Cross Reference List of IHSSs/PACs

IHSS NO	PAC NO	PAC NAME
101*	000-101	Solar Ponds
102	800-102	Oil Sludge Pit
103	800-103	Chemical Burial
104	800-104	Liquid Dumping
105.1	800-105.1	Westernmost Out-of-Service Fuel Tanks
105.2	800-105.2	Easternmost Out-of-Service Fuel Tanks
106	800-106	Outfall
107	800-107	Hillside Oil Leak
108	900-108	Trench T-1
109	900-109	Trench T-2
110	NE-110	Trench T-3
111.1	NE-111.1	Trench T-4
111.2	NE-111.2	Trench T-5
111.3	NE-111.3	Trench T-6
111.4	NE-111.4	Trench T-7
111.5	NE-111.5	Trench T-8
111.6	NE-111.6	Trench T-9
111.7	NE-111.7	Trench T-10
111.8	NE-111.8	Trench T-11
112	900-112	903 Pad
113	900-113	Mound Area
114*	NW-114	Present Landfill
115	SW-115	Original Landfill
116.1	400-116.1	West Loading Dock, Building 447 (IAG Name: West Loading Dock Area)
116.2	400-116.2	South Loading Dock, Building 444 (IAG Name: South Loading Dock Area)
117.1	500-117.1	North Site Chemical Storage
117.2	500-117.2	Middle Site Chemical Storage
117.3	600-117.3	South Site Chemical Storage
118.1	700-118.1	West of Building 730 Solvent Spill
118.2	700-118.2	South End of Building 776 Solvent Spill
119.1	900-119.1	West Scrap Metal Storage Area (IAG-Name: West Area Solvent Spill)

Cross Reference List of IHSSs/PACs (Continued)

IHSS NO	PAC NO	PAC NAME
119.2	900-119.2	East Scrap Metal Storage Area (IAG Name: East Area Solvent Spill)
120.1	600-120.1	Fiberglassing Area North of Building 664
120.2	600-120.2	Fiberglassing Area West of Building 664
121*	000-121	Original Process Waste Lines
122*	400-122	Underground Concrete Tanks
123.1*	700-123.1	Valve Vault 707
123.2*	700-123.2	Valve Vault West of Building 707
124.1*	700-124.1	30,000 Gallon Tank (Tank #68)
124.2*	700-124.2	14,000 Gallon Tank (Tank #66)
124.3*	700-124.3	14,000 Gallon Tank (Tank #67)
125*	700-125	Holding Tank (Tank #66)
126.1*	700-126.1	Westernmost Out-of-Service Waste Tank
126.2*	700-126.2	Eastern most Out-of-Service Waste Tank
127	700-127	Low-Level Radioactive Waste Leak
128	300-128	Oil Burn Pit No. 1
129*	400-129	Oil leak
130	900-130	Radioactive Site - 800 Area Site No. 1
131	700-131	Radioactive Site - 700 Area Site No. 1
132	700-132	Radioactive Site - 700 Area Site No. 4
133.1	SW-133.1	Ash Pit I-1
133.2	SW-133.2	Ash Pit I-2
133.3	SW-133.3	Ash Pit I-3
133.4	SW-133.4	Ash Pit I-4
133.5	SW-133.5	Incinerator
133.6	SW-133.6	Concrete Wash Pad
134	300-134.1 & 300-134.2	Metal Disposal Site North Area (IAG Name: Lithium Metal Destruction Site) & Reactive Metal Destruction Site South Area
135	300-135	Cooling Tower Blowdown
136.1	400-136.1	Cooling Tower Pond West of Building 444 (IAG Name: Cooling Tower Pond Northeast Corner of Building 460)
136.2	400-136.2	Cooling Tower Pond East of Building 444 (IAG Name: Cooling Tower Pond West of Building 460)
137	700-137	Cooling Tower Blowdown Buildings 712 and 713 (IAG Name: Cooling Tower Blowdown Building 774)

Cross Reference List of IHSSs/PACs (Continued)

IHSS NO	PAC NO	PAC NAME
138	700-138	Cooling Tower Blowdown Building 779
139.1	700-139.1	Hydroxide Tank Area Spill (139.1N is also known as T-107/T-108 condensate tanks)
139.2	700-139.2	Hydrofluoric Acid Tanks Spill
140	900-140	Hazardous Disposal Area (IAG Name: Reactive Metal Destruction Site)
141	900-141	Sludge Disposal
142.1	NE-142.1	A-1 Pond
142.10	SE-142.10	C-1 Pond
142.11	SE-142.11	C-2 Pond
142.12	NE-142.12	Flume Pond (IAG Name: A-5 Pond)
142.2	NE-142.2	A-2 Pond
142.3	NE-142.3	A-3 Pond
142.4	NE-142.4	A-4 Pond
142.5	NE-142.5	B-1 Pond
142.6	NE-142.6	B-2 Pond
142.7	NE-142.7	B-3 Pond
142.8	NE-142.8	B-4 Pond
142.9	NE-142.9	B-5 Pond
143	700-143	Old Outfall - Building 771 (IAG Name: Old Outfall)
144	700-144	Sewer Line Overflow (IAG Name: Sewer Line Break)
145	800-145	Sanitary Waste Line Leak
146.1a	700-146.1	7,500 Gallon Tank (31)
146.2a	700-146.2	7,500 Gallon Tank (32)
146.3a	700-146.3	7,500 Gallon Tank (34W)
146.4a	700-146.4	7,500 Gallon Tank (34E)
146.5a	700-146.5	7,500 Gallon Tank (30)
146.6a	700-146.6	7,500 Gallon Tank (33)
147.1*	700-147.1	Process Waste Line Leaks (IAG Name: Maas Area)
147.2	800-147.2	Building 881 Conversion Activity Contamination (IAG Name: Owen Area)
148	100-148	Waste Spills
149	700-149	Effluent Pipe
150.1	700-150.1	Radioactive Site North of Building 771 (IAG Name: Radioactive Leak North of Building 771)

Cross Reference List of IHSSs/PACs (Continued)

IHSS NO	PAC NO	PAC NAME
150.2	700-150.2	Radioactive Site West of Building 771 (IAG Name: Radioactive Leak West of Building 771)
150.3	700-150.3	Radioactive Site Between Buildings 771 & 774 (IAG Name: Radioactive Leak Between Buildings 771 & 774)
150.4	700-150.4	Radioactive Site Northwest of Building 750 (IAG Name: Radioactive Leak East of Building 750)
150.5	700-150.5	Radioactive Site West of Building 707 (IAG Name: Radioactive Leak West of Building 707)
150.6	700-150.6	Radioactive Site South of Building 779 (IAG Name: Radioactive Leak South of Building 779)
150.7	700-150.7	Radioactive Site South of Building 776 (IAG Name: Radioactive Leak South of Building 776)
150.8	700-150.8	Radioactive Site Northeast of Building 779 (IAG Name: Radioactive Leak Northeast of Building 779)
151	300-151	Fuel Oil Leaks
152	600-152	Fuel Oil Tank
153	900-153	Oil Burn Pit No. 2
154	900-154	Pallet Burn Site
155	900-155	903 Lip Area
156.1	300-156.1	Building 334 Parking Lot
156.2	NE-156.2	Soil Dump Area
157.1	400-157.1	Radioactive Site North Area
157.2	400-157.2	Radioactive Site South Area
158	500-158	Radioactive Site - Building 551
159	500-159	Radioactive Site - Building 559
160	600-160	Radioactive Site - Building 444 Parking Lot
161	600-161	Radioactive Site - West of Building 664
162	700-162	Radioactive Site - 700 Area Site #2
163.1	700-163.1	Radioactive Site - 700 Area Site No.3 Wash Area
163.2	700-163.2	Radioactive Site - 700 Area Site No.3 Buried Slab
164.1	600-164.1	Radioactive Site - 800 Area Site No. 2 Concrete Slab
164.2	800-164.2	Radioactive Site - 800 Area Site #2, Building 886 Spills
164.3	800-164.3	Radioactive Site - 800 Area Site #2, Building 889 Storage Pad
165	900-165	Triangle Area

Cross Reference List of IHSSs/PACs (Continued)

IHSS NO	PAC NO	PAC NAME
166.1	NE-166.1	Trench A
166.2	NE-166.2	Trench B
166.3	NE-166.3	Trench C
167.1*	NE-167.1	Spray Field; North Area
167.2*	NE-167.2	Spray Field; Pond Area (Center Area)
167.3*	NE-167.3	Spray Field; South Area
168*	SW-168	West Spray Field
169	500-169	West Drum Peroxide Burial
170	NW-170	PU&D Storage Yard - Waste Spills
171	300-171	Solvent Burning Ground
172	000-172	Central Avenue Waste Spill
173	900-173	South Dock - Building 991 (IAG Name: Radioactive Site 900 Area)
174*	NW-174	PU&D Container Storage Facilities (2)
175*	900-175	S&W Building 980 Contractor Storage Facility
176	900-176	S&W Contractor Storage Yard
177*	800-177	Building 885 Drum Storage Area
178*	800-178	Building 881 Drum Storage Area
179*	800-179	Building 865 Drum Storage Area
180*	800-180	Building 883 Drum Storage Area
181*	300-181	Building 334 Cargo Container Area
182*	400-182	Building 444/453 Drum Storage Area
183	900-183	Gas Detoxification Area
184	900-184	Building 991 Steam Cleaning Area
185*	700-185	Solvent Spill
186	300-186	Valve Vault 12
187	400-187	Sulfuric Acid Spill (IAG Name: Acid Leaks (2))
188	300-188	Acid Leak
189	600-189	Multiple Acid Spills 218 Tanks (IAG Name: Multiple Acid Spills)
190	000-190	Caustic Leak
191	400-191	Hydrogen Peroxide Spill
192*	000-192	Antifreeze Discharge
193*	400-193	Steam Condensate Leak
194*	700-194	Steam Condensate
195*	NW-195	Nickel Carbonyl Disposal

Cross Reference List of IHSSs/PACs (Continued)

IHSS NO	PAC NO	PAC NAME
196	100-196	Water Treatment Plant Backwash Pond
197	500-197	Scrap Metal Sites
199	NA	Contamination of the Land Surface
200	NA	Great Western Reservoir
201	NA	Standley Lake Reservoir
202	NA	Mower Reservoir
203*	NW-203	Inactive Hazardous Waste Storage Area
204*•	400-204	Original Uranium Chip Roaster
205*	400-205	Building 460 Sump #3 Acid Side
206*	300-206	Inactive D-836 Hazardous Waste Tank
207*	400-207	Inactive 444 Acid Dumpster
208*	400-208	Inactive 444/447 Waste Storage Area
209	SE-209	Surface Disturbance Southeast of Building 881
210*	900-210	Unit 16, Building 980 Cargo Container
211*•	800-211	Building 881 Drum Storage, Unit 26
212*#	300-212	Building 371 Drum Storage, Unit 63
213*	900-213	Unit 15, 964 Pad Pondcrete Storage
214*	700-214	750 Pad Pondcrete & Saltcrete Storage, Unit 25
215*	700-215	Tank T-40, Unit 55.13 (Cross reference with IHSS 121)
216.1	NE-216.1	East Spray Fields - North Area
216.2	NE-216.2	East Spray Fields - Center Area
216.3	NE-216.3	East Spray Fields - South Area
217•	800-217	Building 881, CN Bench Scale Treatment, Unit 32

Notes:

1. NA - not applicable
2. IHSS 198 was deleted in 1990.
3. * denotes IHSSs that are RCRA units per the Historical Release Report (see RFCA Attachment 12 for reference)
4. • denotes IHSSs that have been closed through the CAD/ROD process.
5. □ denotes tanks that were formerly part of the Original Process Waste Line and were removed in 1972.
6. # denotes that IHSS 212 is addressed in the Part VIII of the Mixed Residue Permit Modification (1992).

ATTACHMENT 4

ENVIRONMENTAL RESTORATION RANKING

Final RFCA
Attachment 4
Update page
February 26, 1999

ENVIRONMENTAL RESTORATION RANKING

A prioritized list of Environmental Restoration (ER) locations was developed to select the top priority locations for remediation. This prioritization will accelerate the cleanup process, which will more quickly reduce risks to human health and the environment. The prioritization of cleanup targets should also result in a reduction of costs associated with cleanup by allowing better planning and more efficient utilization of resources.

An updated methodology for generating this prioritized list is provided in Appendix N of the Implementation Guidance Document (RFCA, Appendix 3), and was developed by a working group composed of EPA, CDPHE, DOE/RFFO, Kaiser-Hill, and RMRS staff. The methodology was implemented by RMRS staff and resulted in a prioritized list of ER locations, as well as identifying and ranking locations that require more information.

The list will be updated annually, or as significant new information becomes available. With the consensus of all parties, the priority of any ER location can be changed prior to updating the list, if additional information clearly indicates a need. The list should continue to be evaluated as data becomes available, and should also be verified by field checks and other processes to corroborate these rankings.

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ER Ranking

Rev. 9/98

Status	Rank	RISS Number and Name	Total Tank Contents	Total Ground Water	Total Subsurface Soil	Total Surface Soil	Total Chemical Score	ALF Score	SW Impact Score Multiplier	Potential for Further Release Multiplier	Professional Judgement Multiplier	Priority Score	Exceeds Tier I AL	General Comments
C-96	1	109 Ryan's Pit		33679	2	<1	33681	10	2	3	1	60	yes	Source removed
C-96	2	110 Trench T-3		26101	1612	<1	27713	10	2	3	1	60	yes	Source removed
C-96	3	111.1 Trench T-4		26101	78	n	26179	10	2	3	1	60	yes	Source removed
SR-98	4	108 Trench T-1		11	11080	<1	11091	9	1	3	2	54	yes	FY98 - source removed, treatment and trench fill in FY99.
C-97	5	113 Mound		19064	6	1	19071	9	3	2	1	54	yes	Source of Mound Plume, removed
	6	112/155 903 Pad and Lip Area		41426	1449	108	42983	10	2	2	1	40	yes	Characterization in FY98/FY99, remediation planned for FY2001.
	7	East Trenches Plume		26105			26105	10	3	1	1	30	yes	Impact on surface water in the S. Walnut Creek drainage
	8	118.1, 132 and 121 Tanks 9 & 10	1194	50000000	2325	2	50003521	10	1.5	2	1	30	yes	Tank 10 source removed. Carbon Tet Plume Source
IAC-98	9	Mound Plume		19067			19067	9	3	1	1	27	yes	Groundwater collection and treatment system in place
IAC-98	10	121 Tank T-40	3570	n	n	<1	3570	7	1	3	1	21	yes	Source removed, tank loamed and stabilized
IAC-98	11	121/124.1/124.2/125 PW Tank T-16N	1453	<1	<1	n	1453	7	1	3	1	21	yes	Source removed, tank loamed and stabilized
IAC-98	12	121 Tanks T-2/T-3, 122 Underground Concrete Tanks	761	270	<1	29	1050	7	1	3	1	21	yes	Tank loamed and stabilized, PAHs in surface soil and groundwater
IAC-98	13	121/124.3 Process Waste Tank T-14	1000	<1	<1	n	1000	6	1	3	1	18	yes	Source removed, tank loamed and stabilized
	14	101 Solar Ponds		2403	<1	14	2417	7	2	1	1	14	yes	HRA 10-4 to 10-6, groundwater from 118.1 not used in ranking
	15	Solar Ponds Plume		2403			2403	7	2	1	1	14	yes	Plume due to NO ₂ impacts surface water in N. Walnut Creek
	16	903 Pad & Ryan's Pit Plume		73365			73365	10	1	1	1	10	yes	No impact to surface water in the Woman Creek drainage
	17	Carbon Tetrachloride Plume (118.1)		50000000	n	n	50000000	10	1	1	1	10	yes	IHSS 118.1 is suspected source/DNAPL present
	18	881 Hillside Plume		9167	n	n	9167	8	1	1	1	8	yes	No impact on surface water in the Woman Creek drainage
	19	Industrial Area Plume		2615	n	n	2615	7	1	1	1	7	yes	No known impact on surface water
	20	121 Tank T-29 (Tank 207)	15	<1	<1	4110	4125	7	1	2	0.5	7	yes	New 1995 data-PAHs in surface soil
	21	PU&D Yard Plume		553			553	6	1	1	1	6	no	Source not present
	22	160 Rad Site Bldg 664 Parking Lot		578	n	1	579	6	1	1	1	6	yes	Paved
	23	158 Rad Site - B551/B554		418	n	1	419	5	1	1	1	5	no	Paved
	24	Building 881 Area Plume		257			257	5	1	1	1	5	no	Source may be due to UBC at B881
	25	Building 881 UBC		257	7	n	264	5	1	1	1	5	yes	No pathway known
	26	114-Present Landfill		415	<1	31	446	5	2	1	0.5	5	no	Compliance, presumptive remedy for closure
	27	Present Landfill Area Plume		415			415	5	2	1	0.5	5	no	
	28	Bowman's Pond (PAC 700-1108)		n	n	18	18	1	2	1	2	4		Process knowledge of probable influent liquids
	29	111.4 SE Trenches T-7		<1	128	<1	128	4	1	1	1	4	yes	Score includes newly discovered sample data
	30	165 Triangle Area		215	<1	14	229	4	2	1	0.5	4	yes	HRA, less than 10-6, metals
IAC-96	31	129 - Tank T-4, outside steam plant	<1	n	n	2	2	1	1	3	1	3	no	Tank loamed and stabilized, tank not breached
	32	121, 126.1, 126.2 Tank T-8	<1	n	<1	<1	<1	1	1	3	1	3		
	33	111.8 Trench T-11		96	<1	<1	96	3	1	1	1	3	no	Organics in groundwater
	34	Building 779 UBC		n	n	64	64	2	1	1	1	2	no	Contamination due to B779
	35	121 Tank T-27		n	n	59	59	2	1	1	1	2	no	PAHs in surface soil
	36	143 771 Outfall		46	<1	3	49	2	1	1	1	2	no	
	37	176 SAW Yard		n	n	26	26	2	1	1	1	2	no	
	38	131 Rad Site #1 - 700 Area		n	n	4	4	1	1	2	1	2	no	
	39	133.4 Ash Pit #4		44	<1	2	46	2	1	1	1	2	no	HRA, 10E-4 to 10-6
	40	133.1 Ash Pit #1		44	2	<1	46	2	1	1	1	2	no	HRA, 10E-4 to 10-6
	41	133.2 Ash Pit #2		44	2	<1	46	2	1	1	1	2	no	HRA, 10E-4 to 10-6
	42	133.3 Ash Pit #3		44	<1	<1	44	2	1	1	1	2	no	HRA, 10E-4 to 10-6
	43	Old Landfill Area Plume		174			174	4	1	1	0.5	2	no	HRA, 10E-4 to 10-6 Action required due to physical hazard
	44	115 Original Landfill		172	<1	27	199	4	1	1	0.5	2	no	HRA, 10E-4 to 10-6
	45	190 Caustic Leak		12	n	<1	12	1	1	1	1	1	no	Evaluate using approved NAFSA process
	46	Building 123 Site (IHSSs 148, 121, 123/UBC, RCRA Unit 40)		9	4	1	14	1	1	1	1	1	no	Building removed to the slab in FY98
	47	120.1 North Fiberglassing area		n	n	20	20	1	1	1	1	1	no	Contamination probably from 400 Complex
	48	150.3 Rad Site Between B771 & B774		n	n	16	16	1	1	1	1	1	no	
	49	214 750-Pad pondcrete/solcrete storage		n	n	13	13	1	1	1	1	1	no	
	50	157.1 Rad Site North-Central Ave Ditch		5	n	5	10	1	1	1	1	1	no	
	51	157.2 Rad Site south		2	n	5	7	1	1	1	1	1	no	PCB hit above AL, listed under PCB 9.
	52	120.2 West Fiberglassing Area		n	n	6	6	1	1	1	1	1	no	

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n = data not available

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ER Ranking

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Status	Rank	SHSS Number and Name	Total Tank Contents	Total Ground Water	Total Subsurface Soil	Total Surface Soil	Total Chemical Score	ALF Score	SW Impact Score Multiplier	Potential for Further Release Multiplier	Professional Judgement Multiplier	Total Priority Score	Exceeds Tier I AL	General Comments
	53	144 Sewer line overflow		n	n	4	4	1	1	1	1	1	no	
	54	136.2 Cooling Tower Pond East of B444		n	n	4	4	1	1	1	1	1	no	
	55	163.1 Rad Site 700 North B774		n	n	2	2	1	1	1	1	1	no	
	56	Building 440 Site		n	6	n	6	1	1	1	1	1	no	Investigation done for B440 expansion
	57	177-OU 10		<1	n	2	2	1	1	1	1	1	no	PCB hit above AL
	58	186 In Old Landfill		44	<1	<1	44	2	1	1	0.5	1	no	HHFA, 10E-4 to 10-6
	59	119.1 - OU 1- Solvent Spill Site		<1	29	3	32	2	1	1	0.5	1	no	CADPROD amendment pending
	60	139.1 KOH, NaOH condensate tanks spill		n	n	19	19	1	1	1	0.5	0.5	no	PAHs in surface soil
	61	139.2 Hydrofluoric Acid Tank spills		n	n	19	19	1	1	1	0.5	0.5	no	PAHs in surface soil
	62	111.2 Trench T-5		<1	<1	1	1	1	1	1	0.5	0.5	no	
	63	153 Oil Burn Pit		<1	<1	n	<1	0	1	1	1	0	no	In PA fence, eleven feet of soil removed during fence construction
	64	164.3 Rad Site #2 800 Area, 887 Pad		n	n	<1	<1	0	1	1	1	0	no	
	65	127 Low level Rad waste leak		n	n	<1	<1	0	1	1	1	0	no	
	66	186 Valve Vault 11, 12 and 13		n	n	<1	<1	0	1	1	1	0	no	
	67	150.4 Rad Site NW of B750		n	n	<1	<1	0	1	1	1	0	no	
	68	159 Rad Site B559		<1	<1	n	<1	0	1	1	1	0	no	
	69	111.3 SE Trenches T-6		n	<1	<1	<1	0	1	1	1	0	no	
	70	111.5 SE Trenches T-8		<1	<1	<1	<1	0	1	1	1	0	no	
	71	111.6 SE Trenches T-9		<1	<1	<1	<1	0	1	1	1	0	no	
	72	138 Bldg 779 Cooling Tower Blowdown		n	n	<1	<1	0	1	1	1	0	no	
	73	164.2 Rad Site #2, 800 Area, Bldg 886 Spill		<1	<1	<1	<1	0	1	1	1	0	no	
	74	111.7 SE Trenches T-10		n	td	td	<1	0	1	1	1	0	no	
	75	137 Bldg 712/713 Cooling Tower Blowdown		n	n	n	0	0	1	1	1	0	no	
	76	118.2 Solvent Spills North End of Bldg. 707		<1	n	<1	0	0	1	1	1	0	no	Evaluate using approved NAFNA process
	77	121-PO8 OPWL Pipeline; 135 ft; Bldg. 881		n	n	n	0	0	1	1	1	0		Evaluate using approved NAFNA process
	78	121-PS7 OPWL Pipeline; 112 ft; Bldg. 122		n	n	n	0	0	1	1	1	0		Evaluate using approved NAFNA process
	79	121-T12 Invalid tank location		n	n	n	0	0	1	1	1	0		Evaluate using approved NAFNA process
	80	121-T31 Invalid tank location		n	n	n	0	0	1	1	1	0		Evaluate using approved NAFNA process
	81	121-T33 Invalid tank location		n	n	n	0	0	1	1	1	0		Evaluate using approved NAFNA process
	82	121-T34 Invalid tank location		n	n	n	0	0	1	1	1	0		Evaluate using approved NAFNA process
	83	121-T35 Invalid tank location		n	n	n	0	0	1	1	1	0		Evaluate using approved NAFNA process
	84	175 S&W B.980 Container Storage Facility		n	n	<1	0	0	1	1	1	0		Evaluate using approved NAFNA process
	85	182 444/453 Drum Storage Area		n	n	n	0	0	1	1	1	0	no	Evaluate using approved NAFNA process
	86	205 Sump #3 Acid Site, SE B460		n	n	<1	0	0	1	1	1	0		Evaluate using approved NAFNA process
	87	206 Inactive D-386 HW Tank B374		n	n	<1	0	0	1	1	1	0		Evaluate using approved NAFNA process
	88	207 Inactive B444 Acid Dumpsters		n	n	<1	0	0	1	1	1	0		Evaluate using approved NAFNA process
	89	208 Inactive 444/447 Waste Storage		n	n	<1	0	0	1	1	1	0		Evaluate using approved NAFNA process
	90	187 Sulfuric Acid Spill; B443		n	n	n	0	0	1	1	1	0		Evaluate using approved NAFNA process
	91	134(N) Lithium Metal Destruction Site		<1	<1	<1	0	0	1	1	1	0		Evaluate by NAFNA process/ie B335 D&D
	92	134(S) Lithium Metal Destruction Site		n	n	<1	0	0	1	1	1	0		Evaluate by NAFNA process/ie B335 D&D
	93	150.6 Loading Dock		n	n	<1	0	0	1	1	1	0		Evaluate with NAFNA/PCB Hot Spot only
	94	154 Pallet Burn Site		n	n	<1	0	0	1	1	0.5	0		Removed during FA construction, verify only
	INV	171 Fire Training		134	n	<1	134	4	1	2	2	16	no	Empirical data indicates free product present
	INV	Building 444 UBC		156	n	<1	156	4	1	1	2	8		Known contaminant plume
	INV	Building 707 UBC		142	n	<1	0	1	1	1	2	2		Many known spills
	INV	121 Old Process Waste Lines-includes: 66 segments (35,000') & 22 tank units-not investigated 123.2 Valve Vault w. of 707 147.1 MAAS Area 149.1 OPWL to SEPS		1013	n	n	1013	7	1	1	2	14	yes	SHSS 121 includes the following italicized SHSSs Not characterized, probably highly contaminated Not characterized, probably highly contaminated Not characterized, probably highly contaminated Not characterized, probably highly contaminated

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ER Ranking

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ER Ranking

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Status	Rank	HSS Number and Name	Total Tank Contents	Total Ground Water	Total Subsurface Soil	Total Surface Soil	Total Chemical Score	ALF Score	SW Impact Score Multiplier	Potential for Further Release Multiplier	Professional Judgement Multiplier	Total Priority Score	Exceeds Tier 1 AL	General Comments
NFA		142.9 Pond B-5		<1	<1	<1	0	0	1	1	1	0		Passed CDPHE screen w/ pond and sediment data
NFA		152 Fuel Oil Tank 221 Spill		n	n	n	0	0	1	1	1	0		Evaluated using approved NANFA process
NFA		156.2 Soil Disposal Area		<1	<1	<1	0	0	1	1	1	0		HIRA, less than 10-6
NFA		166.1 Landfill Trench A-		<1	<1	n	0	0	1	1	0.5	0		Passed CDPHE screen
NFA		166.2 Landfill Trench B		<1	<1	n	0	0	1	1	0.5	0		Passed CDPHE screen
NFA		166.3 Landfill Trench C		<1	<1	n	0	0	1	1	0.5	0		Passed CDPHE screen
NFA		167.1 N Landfill Spray Area		<1	<1	<1	0	0	1	1	0.5	0		HIRA, less than 10-6
NFA		167.2 Landfill Pond Spray Area		n	<1	<1	0	0	1	1	0.5	0		HIRA, 10E-4 to 10-6
NFA		167.3 Landfill South Spray Area		n	n	<1	0	0	1	1	0.5	0		Evaluated using approved NANFA process
NFA		169 Hydrogen Peroxide Spill		n	n	n	0	0	1	1	0.5	0		Evaluated using approved NANFA process
NFA		183 Gas Detox Facility		n	n	n	0	0	1	1	0.5	0		Evaluated using approved NANFA process
NFA		189 Nitric Acid Tank		n	n	n	0	0	1	1	0.5	0		Evaluated using approved NANFA process
NFA		203 Inactive Hazardous Waste Storage Area		n	n	<1	0	0	1	1	0.5	0		Evaluated using approved NANFA process
NFA		209 Surface Disturbances		<1	<1	<1	0	0	1	1	0.5	0		Passed CDPHE screen
NFA		216.1 East Spray Field - OU 6		n	<1	<1	0	0	1	1	0.5	0		Passed CDPHE screen
NFA		F167.3 Former S. Spray Field		<1	<1	<1	0	0	1	1	0.5	0		Passed CDPHE screen
C-97		102 Oil Sludge Pit		<1	<1	<1	0	0	2	1	0.5	0		HIRA, less than 10-6
C-97		103 Chemical Burial		<1	<1	<1	<1	0	2	1	0.5	0		HIRA, less than 10-6
C-97		104 Liquid Dumping		<1	10	<1	10	4	2	1	0.5	4	yes	HIRA, less than 10-6
C-97		105.1 W Out-of-Service Fuel Tank		<1	<1	<1	0	0	2	1	0.5	0		HIRA, less than 10-6
C-97		105.2 E Out-of-Service Fuel Tank		<1	<1	<1	0	0	2	1	0.5	0		HIRA, less than 10-6
C-97		106 Outfall		<1	<1	<1	0	0	2	1	0.5	0		HIRA, less than 10-6
C-97		107 Hillside Oil Leak		<1	<1	<1	0	0	2	1	0.5	0		HIRA, less than 10-6
C-97		119.2 Solvent Spill Site		9	<1	<1	9	1	2	1	0.5	1	no	HIRA, less than 10-6
C-97		130 800 Area Rad Site #1		<1	34	<1	34	2	2	1	0.5	2	yes	HIRA, less than 10-6
C-97		145 Sanitary Waste Line Leak		<1	<1	<1	0	0	2	1	0.5	0		HIRA, less than 10-6
C-97		199 Offsite Land Surface		n	<1	<1	0	0	1	1	0.5	0		HIRA, 10E-4 to 10-6 No groundwater issues
C-97		200 Great Western Reservoir		<1	<1	<1	0	0	1	1	0.5	0		HIRA, 10E-4 to 10-6, plus sediment samples
C-97		201 Standley Lake		<1	<1	<1	0	0	1	1	0.5	0		Passed CDPHE screen
C-97		202 Mower Reservoir		<1	<1	<1	0	0	1	1	0.5	0		Passed CDPHE screen
C-95		168 West Spray Field		190	<1	<1	190	4	1	1	0.5	2	no	Passed CDPHE screen-CAD/ROD complete
C-95		178 B881 Drum Storage, Rm. 165		n	n	n	0	0	1	1	0.5	0		No source found-CAD/ROD complete
C-95		179 B865 Drum Storage, Rm. 145		n	n	n	0	0	1	1	0.5	0		RCRA Clean Closure CAD/ROD complete
C-95		180 B883 Drum Storage, Rm. 104		n	n	n	0	0	1	1	0.5	0		RCRA Clean Closure CAD/ROD complete
C-95		204 Original Uranium Chip Roaster		n	n	n	0	0	1	1	0.5	0		RCRA Clean Closure CAD/ROD complete
C-95		211 B881 Drum Storage #26-R211		n	n	n	0	0	1	1	0.5	0		No source found-CAD/ROD Complete
C-95		217 B881 Cyanide Treatment - #32		n	n	n	0	0	1	1	0.5	0		No source found-CAD/ROD Complete
C-94		185 Solvent Spill		n	n	n	0	0	1	1	0.5	0		No source found-CAD/ROD Complete
C-94		192 Pipeline		3	n	n	3	1	1	1	0.5	0.5	no	Evaluated using approved NANFA process
C-94		193 Steam Condensate		n	n	n	0	0	1	1	0.5	0		No source found-CAD/ROD Complete
C-94		194 Solvent Spill		n	n	n	0	0	1	1	0.5	0		No source found-CAD/ROD Complete
C-94		195 Nickel Carbonyl Disposal		n	n	n	0	0	1	1	0.5	0		No source found-CAD/ROD Complete
C-96		Closure complete												
IAC-96		Interim Action Complete												
NFA		Evaluated and recommended for NANFA status												
INV		Needs further investigation												
LOW		Low priority												

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n = data not available

ATTACHMENT 5

**ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE
ACTION LEVELS AND STANDARDS FRAMEWORK FOR
SURFACE WATER, GROUND WATER, AND SOILS**

Rocky Flats Environmental Technology Site Action Levels and Standards Framework for Surface Water, Ground Water, and Soils

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1.0 GENERAL BACKGROUND

1.1 Goal of Action Levels and Standards Framework

A working group consisting of the Department of Energy (DOE), the Environmental Protection Agency (EPA), the Colorado Department of Public Health and Environment (CDPHE), and Kaiser-Hill teams was formed to develop a consensus proposal for the appropriate cleanup standards and action levels that should apply to the Rocky Flats Environmental Technology Site (RFETS). This Action Levels and Standards Framework for Surface Water, Ground Water, and Soil (ALF) presents the final recommendation of the Working Group, incorporates comments from stakeholders, and is summarized in Summary Table 1. It has been developed in a manner generally consistent with the Rocky Flats Vision (Vision) and Rocky Flats Cleanup Agreement (RFCA) Preamble Objectives. In some cases, the working group found it necessary to more precisely define aspects of the objectives so that applicability of action levels and required mitigating actions could be completely defined. The goal of the ALF is to:

- provide a basis for future decision-making;
- define the common expectations of all parties; and
- incorporate land- and water-use controls into Site cleanup.

Four future conceptual land uses have been determined and their approximate areal extent are delineated on the map attached to this document as Figure 1. These land use areas include: (1) potential capped areas underlain by either waste disposal cells or contaminated materials closed in-place; (2) an industrial use area; (3) a restricted open space area; (4) another restricted open space area with low levels of plutonium contamination in surface soils; and (5) an unrestricted open space area that, while it would be managed as open space, actually could be available for any use. The capped areas on Figure 1 are proposed and will be finalized in an RFETS Closure Plan. At that time, the capped areas shown on Figure 1 not under an RFETS Closure Plan cap will be considered restricted open space.

This document describes the parties' commitments and recommendations for both action levels, cleanup levels, and standards. Action levels are numeric levels that, when exceeded, trigger an evaluation, remedial action, and/or management action. Final cleanup levels will be determined in the Corrective Action Decision (CAD)/Record of Decision (ROD). For interim remedial actions, interim cleanup levels will equal Tier I action levels unless some other ALF provision requires a greater level of cleanup (e.g., protection of surface water). This concept will be presented for public comment in a document that also includes the following:

- resolution of the "to-be-determined" (TBD) action levels in Tables 4 and 5 in the ALF; and
- "put-back" levels for interim soil removals.

In addition, the Parties are committed to resolve whether chemical risk and radiation dose will be evaluated and applied independently or cumulatively. The schedule for these activities will consist of a public comment period from September 1, 1996 to October 4, 1996 with a final decision by October 18, 1996.

A standard is an enforceable narrative and/or numeric restriction established by regulation and applied so as to protect one or more existing or potential future uses. Within this framework, standards are associated with surface water use classifications and applied at points of compliance (POCs). Standards are not being directly applied to ground water or soils. Closure performance standards apply to Resource Conservation and Recovery Act (RCRA) units and are explained in the RFCA.

Much of this framework is based on Maximum Contaminant Levels (MCLs). MCLs have been established by EPA for many chemical contaminants and represent the maximum permissible level of a contaminant in drinking water. The regulatory citation that lists MCLs is Title 40 Code of Federal Regulations Parts 141.61 and 141.62. Where a MCL for a particular contaminant is lacking, the residential ground water ingestion-based Preliminary Programmatic Remediation Goal (PPRG) will be used.

1.2 Programmatic Assumptions

The working group developed this framework using the following inter-related programmatic or Site-Wide assumptions:

- The framework must be consistent with the Vision and RFCA Preamble;
- Implementation of the framework must protect human health and the environment; and
- Implementation of the framework must protect surface water uses and quality.

1.3 Action Prioritization and Implementation

Remedial decisions will be supportive of Intermediate and Long-Term Site Conditions as discussed in the RFCA Preamble. Protection of all surface water uses with respect to fulfillment of the Intermediate and Long-Term Site Conditions will be the basis for making

soil and ground water remediation and management decisions. Actions will be designed to prevent adverse impacts to ecological resources and ground water consistent with the ALF. Because the ALF does not address the inherent value of ground water, any residual effects on ground water not addressed through this Framework will be addressed under a Natural Resources Damage Assessment (NRDA).

Actions required as a result of exceedances of the standards or action levels described in this document will be prioritized on the Environmental Restoration (ER) Ranking. The ER Ranking will, in turn, be considered in the Budget and Work Planning Process (RFCA, Part 11). These interim remedial decisions may be implemented by means of an accelerated action (Proposed Action Memorandum [PAM], Interim Measure/Interim Remedial Action [IM/IRA], or RFCA Standard Operating Protocol [RSOP]) or addressed as necessary in the CAD/ROD for the affected area. Actions will be developed in an integrated manner with other actions being taken and will be consistent with best management practices.

1.4 Colorado Water Quality Control Commission (WQCC)

The WQCC determines water quality standards throughout Colorado. This ALF proposes several changes to the existing use classifications and standards for water at RFETS which will require approval by the WQCC. Approval of these changes by the WQCC is not guaranteed. If the WQCC does not adopt the recommendations, this Framework will be modified accordingly. The local municipalities, including-- Westminster, Broomfield, Thornton, and Northglenn-- have been and will be involved and consulted in recommendations to the WQCC.

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2.0 SURFACE WATER

2.1 Basis for Standards and Action Levels

Some of the surface water quality standards and action levels proposed in this section differ from the existing state water quality standards. It will be necessary, therefore, to petition the WQCC for these changes. Petitions must provide sufficient rationale and justification to document that all water uses presented in the Vision will be protected, and will be supported by all parties. Once these changes to the water quality standards have been made, EPA will issue a new National Pollutant Discharge Elimination System (NPDES) permit within six months of WQCC action. Local municipalities will be involved and consulted in surface water decisions.

Surface water exists in Areas 2, 3, and 4 on Figure 1, as well as immediately off-site. The standards, action levels, and POCs are based on the following refinement of land uses (assuming current pond water transfer configurations):

- Area 2 (restricted open space) will include all surface water down to, and including, the terminal ponds (Ponds A-4 and B-5) in Walnut Creek. For Woman Creek, only Pond C-2 is in Area 2. Therefore, the surface water in Area 2 is consistent with Segment 5 of Big Dry Creek.
- Areas 3 and 4 (unrestricted open space and restricted open space due to low levels of surficial plutonium contamination, respectively) will include the streams from the terminal ponds to the plant boundary in Walnut Creek and all of Woman Creek except Pond C-2. The surface water in Areas 3 and 4 is part of Segment 4a/4b of Big Dry Creek.

2.2 Numeric Levels During Active Remediation (Near-Term Site Condition)

During the period of active remediation, the Table 1 values will apply as standards in Segment 4a/4b of Big Dry Creek and as action levels in Segment 5. This surface water framework reflects the current classifications set by the WQCC. Any future changes to the classifications made by the WQCC will be incorporated into this document.

A. Non-radionuclides

1. The numeric values that will apply throughout both stream segments are based on surface water use classifications consistent with the uses described in the RFCA Preamble are as follows:
 - Water Supply;
 - Aquatic Life - Warm 2;
 - Recreation 2; and
 - Agricultural.
2. Numeric values will be derived from the following:
 - a. For metals, the lower of either the aquatic life values listed in Table 3 of the Basic Standards and Methodologies for Surface Water or the Segment-Specific Water Quality Standards Apply.
 - b. For inorganics, the Segment-Specific Water Quality Standards apply, except for nitrate which will equal 100 milligrams/liter (mg/L) (agricultural use value).
 - c. Any contamination in surface water resulting from releases from a unit at RFETS subject to RCRA interim status requirements will be addressed through this ALF and through remedial actions rather than through RCRA closure (see Attachment 10 to RFCA, RCRA Closure for Interim Status Units). This would include surface water containing nitrates that has been impacted by the Solar Ponds ground water plume. Addressing the nitrates through this framework will allow these waters to be managed in a more cost-effective and flexible manner. The parties recognize that changes in the management of nitrates may cause the surface water to more routinely approach the current 10 mg/L standard at the POC.
 - d. Due to detention and batch release operations of Pond A-4 and Pond B-5 waters, exceedance of the numerical pH of 9.00 occurs. Both the wastewater treatment plant effluent and storm water inflows to the ponds have pH values within the numerical range of 6.5 to 9.00 prior to detention in Pond B-5 and A-4; however, the nutrient loading to the ponds promotes algae

growth which can shift carbonate equilibria. These conditions cause pH exceedance above 9.00 (with a calculated 85th percentile value of 9.10). All parties agree that aquatic use is likely not impacted by pH exceedances; however, the DOE should strive to control pH in the pond waters through prudent pond water management.

- e. For organic chemicals, the following applies:
 - In Segment 4a/4b, water quality standards will apply in accordance with the use classifications identified in 2.2.A.1 above; and
 - In Segment 5, the organic chemical MCLs (or corresponding PPRGs) will apply as action levels (Table 1). Therefore, the underlying Segment 5 organic standards will not apply during the period of active remediation.
- 3. Temporary modifications to the numeric values during active remediation may be developed through subsequent working group efforts.
 - a. The basis for proposing the temporary modifications may include one or more of the following:
 - A determination of ambient conditions in a manner similar to the existing Segment 5 temporary modifications;
 - A mass-balance equation that calculates maximum influent concentrations in Segment 5 that will be protective of numeric values at Segment 4a/4b POCs without allowing treatment within waters of the State; and
 - Some other methodology agreed to by all parties.
 - b. These temporary modifications should be developed together with other stakeholders (i.e., the local municipalities that are impacted by surface water from the RFETS).

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B. Radionuclides

1. Numeric values for plutonium and americium are risk-based (10^{-6} increased carcinogenic risks to human health from direct exposure including consumption).
2. Both radionuclides will be analyzed separately, and compared to the numeric value below:
 - 0.15 pCi/L for plutonium and
 - 0.15 pCi/L for americium.

There is no total pCi/L limit.

3. The parties agree that in the unlikely event that the plutonium and americium numerical standards are exceeded, the DOE will make every effort to identify the source of the exceedance. This will include documenting: hydrologic characteristics; preventive actions, terminal pond operational parameters; and any abnormal conditions and occurrences. Further, specific decisions regarding the terminal pond operations and the release of water will be guided by the Pond Operations Plan. This plan includes specific responses for identified circumstances and preserves dam safety. DOE shall have the burden to demonstrate prudent pond water management and strive to maintain the lowest detained volume practicable in the terminal ponds.
4. Numeric values for other radionuclides will be the site-specific standards found in Table 2 of 5 CCR 1002-8, §3.8.0. The parties will re-examine these values based upon conditions in the basins and will propose alternative values if appropriate.

C. POCs/Action Level Measuring Points

1. In Segment 4a/4b, POCs will be placed at the existing sampling locations for the outfalls of the terminal ponds (Ponds A-4, B-5, and C-2) in both Walnut Creek and Woman Creek. Additional POCs for plutonium, americium, and tritium will be established near where Indiana Street crosses Walnut and Woman Creeks. In the event that exceedances simultaneously occur for either plutonium, americium, or tritium at both the Indiana Street POC and the associated Terminal Pond

POC, then this occurrence will be treated as a single enforcement action. As conditions at the RFETS change, the locations of the POCs may need to change. Such changes can be made by agreement of the Parties pursuant to Part 9 of RFCA.

2. In Segment 5, exceedance of action levels will be measured in the ponds and upstream in the main stream channel at existing gaging/sampling stations or at additional sampling locations in the main stream channel as necessary.
3. Compliance will be measured using a 30-day moving average for those contaminants for which this is appropriate. When necessary to protect a particular use, acute and chronic levels will be measured differently as described in the current Integrated Monitoring Plan.

2.3 Numeric Levels After Active Remediation (Intermediate and Long-Term Site Condition)

When the Intermediate Site Condition is achieved following completion of active remediation, the surface water must be of sufficient quality to support any surface water use classification in both Segments 4a/4b and 5. All final remedies must be designed to protect surface water for any use as measured at the nearest and/or most directly impacted surface water in Segments 4a/4b and 5. Interim remedies will be consistent with this as a goal. Any temporary modifications will be removed. POCs will be at the outfalls of the terminal ponds and near where Indiana Street crosses both Walnut and Woman Creeks. If the terminal ponds are removed, new monitoring and compliance points will be designated and will consider ground water in stream alluvium.

2.4 Action Determinations

- A. When contaminant concentrations exceed the Table 1 standards at a POC, source evaluation and mitigating action will be required. Specific remedial actions will be determined on a case-by-case basis, but must be designed such that surface water will meet applicable standards at the POCs. In the case of standards are exceeded at a POC, DOE will inform the CDPHE and EPA of such exceedances within 15 days of gaining knowledge of the exceedances. In addition, DOE will, within 30 days of gaining knowledge of the exceedances,

submit to CDPHE and EPA a plan and schedule for source evaluation for the exceedance, including a preliminary plan and schedule for mitigating action. Final plans and schedules for mitigating actions will be developed and implemented by DOE, in consultation with CDPHE and EPA, following completion of the source evaluation. Nothing in this paragraph, however, shall preclude DOE from undertaking timely mitigation once a source has been identified. Once an initial notification, source evaluation, and mitigating action have been triggered for a particular exceedance, additional exceedances from the same source would not require separate notifications or additional source evaluations or mitigation. The Standley Lake Protection Project (SLPP) Operations Agreement addresses conditions and timing of storage and releases of waters in the Woman Creek Reservoir. Consistent with the SLPP Operations Agreement, it is the intent of the Parties that waters which meet the standards at the Indiana Street POC are acceptable for any use.

- B. During active remediation, when contaminant concentrations in Segment 5 exceed the Table 1 action levels, source evaluation will be required. If mitigating action is appropriate, the specific actions will be determined on a case-by-case basis, but must be designed such that surface water will meet applicable standards at the POCs. In the case of action level exceedances in Segment 5, DOE will inform the CDPHE and EPA of such exceedances within 15 days of gaining knowledge of the exceedances. In addition, DOE will, within 30 days of gaining knowledge of the exceedances, submit to CDPHE and EPA a plan and schedule for source evaluation for the exceedance, including a preliminary plan and schedule for mitigating action. Final plans and schedules for mitigating actions will be developed and implemented by DOE, in consultation with CDPHE and EPA, following completion of the source evaluation. Nothing in this paragraph, however, shall preclude DOE from undertaking timely mitigation once a source has been identified. Once an initial notification, source evaluation, and mitigating action (if appropriate) have been triggered for a particular exceedance, additional exceedances from the same source would not require separate notifications or additional source evaluations or mitigation.
- C. Exceedances of water quality standards at a POC may be subject to civil penalties under sections 109 and 310(c) of CERCLA. In addition, failure of DOE to notify CDPHE and EPA of such exceedances, or to undertake source evaluations or mitigating actions as described in paragraph 2.4.A, above, shall be enforceable, consistent with the terms of Part 16 of the RFCA.

- D. Exceedances of action levels in Segment 5 shall not be subject to civil penalties. However, failure of DOE to notify CDPHE and EPA of such exceedances, or to undertake source evaluations or mitigating actions (if appropriate) as described in paragraph 2.4.B above, shall be enforceable consistent with the terms of Part 16 of the RFCA.

2.5 Surface Water Monitoring Network

- A. Surface water monitoring will continue as currently established unless subsequent changes are agreed to by all parties. Surface water monitoring will be consistent with the Integrated Monitoring Plan which will be reviewed and revised on an annual basis.
- B. All parties will receive quarterly surface water monitoring reports which will highlight any exceedances of surface water standards or action levels and any significant changes to surface water flow conditions.

3.0 GROUND WATER

3.1 Basis of Action Levels

During the period of active remediation, ground water action levels will apply and must be protective of surface water standards and quality as well as the ecological resources. Domestic use of ground water at RFETS will be prevented through institutional controls. Since no other human exposure to on-site ground water is foreseen, ground water action levels are based on surface water and ecological protection. This framework for ground water action levels assumes that all contaminated ground water emerges to surface water before leaving the RFETS.

3.2 Action Level Strategy

The strategy for ground water is intended to prevent contamination of surface water by applying MCLs as ground water action levels. Where a MCL for a particular contaminant is lacking, the residential ground water ingestion-based PPRG value will apply. Ground water action levels are based on a two-tier approach, Tier I action levels consist of near-source action levels for accelerated cleanups, and Tier II are action levels which are protective of surface water.

A. Tier I

1. Action levels consist of 100 x MCLs (see Table 2).
2. Designed to identify high concentration ground water "sources" that should be addressed through an accelerated action.

B. Tier II

1. Action levels consist of MCLs (see Table 2).
2. Designed to prevent surface water from exceeding surface water standards/action levels by triggering ground water management actions when necessary.
3. Situations where ground water is contaminating or could contaminate surface water at levels above surface water standards/action levels will

trigger a Tier II action.

4. Tier II Action Levels are to be measured in designated wells.
 - a. Tier II wells have been selected by all parties from the existing monitoring network where practical. New wells have been proposed where apparent gaps exist. Designated Tier II wells are listed in Table 3.
 - b. Tier II wells are either currently uncontaminated or contaminated at levels less than MCLs. In general, Tier II wells are located between the downgradient edge of each plume and the surface water towards which the plume is most directly migrating.
 - c. If the proposed new wells are shown to be contaminated or if additional plume information dictates, new or alternate wells will need to be chosen.

3.3 Action Determinations

A. Tier I

1. If Tier I action levels are exceeded, an evaluation is required to determine if remedial or management action is necessary to prevent surface water from exceeding standards. If this evaluation determines that action is necessary, the type and location of the action will be delineated and implemented as an accelerated action. This evaluation may include a trend analysis based on existing data. Accelerated action priority will be given to plumes showing no significant decreasing trend in ground water contaminant concentrations over 2 years.
2. Where background levels exceed action levels, more frequent sampling and remedial actions will not be triggered. For those constituents where high background levels exist, a modified action level considering background will be developed.
3. Additional ground water that does not exceed the Tier I action levels may still need to be remediated or managed through accelerated actions or RODs to protect surface water quality or ecological resources and/or

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prevent action level exceedances at Tier II wells (e.g., lower-level, but fast-moving contamination). The plume areas to be remediated and the cleanup levels or management techniques utilized will be determined on a case-by-case basis.

B. Tier II

1. If concentrations in a Tier II well exceed MCLs during a regular sampling event, as specified in the Integrated Monitoring Plan, monthly sampling in that well will be required. Three consecutive monthly samples showing contaminant concentrations greater than MCLs will trigger an evaluation. This will require a ground water remedial action, if modelling, which considers mass balancing and flux calculations and multiple source contributions, predicts that surface water action levels will be exceeded in surface water. These actions will be determined on a case-by-case basis and will be designed to treat, contain, manage, or mitigate the contaminant plume. Such actions will be incorporated into the ER Ranking in which they will be given weight according to measured or predicted impacts to surface water.
2. Ground water contaminated at levels above ground water action levels currently exists at several locations. Each of these situations will be addressed according to appropriate decision documents.
3. Any contamination in ground water resulting from releases from a unit at RFETS subject to RCRA interim status requirements will be addressed through this ALF and through remedial actions rather than through RCRA closure (see Attachment 10 to RFCA, RCRA Closure for Interim Status Units). This would include ground water containing nitrates from the Solar Ponds plume. Addressing the nitrates through this framework will allow these waters to be managed in a more cost-effective and flexible manner.

C. Other Considerations

1. Efficient, cost-effective, and feasible actions that are taken to remediate or manage contaminated ground water may not necessarily be taken at the leading edge of plumes, but rather at a location within the plume. Factors contributing to this situation could include technical impracticability at the plume edge, topographic or ecologic problems at

the plume edge, etc. This situation may result in a portion of a plume that will not be remediated or managed. This plume portion may cause exceedance of MCLs at Tier II wells or exceedance of surface water standards/action levels. When an up-gradient ground water action is taken that results in this situation, DOE and its subcontractor may request relief from the ground water and/or surface water standards. CDPHE and EPA will evaluate the request and may grant temporary relief or a change to the standards/action level for a specific area. Soil or subsurface soil source removals will not be considered as the sole justification for the changed standard/action level. In addition, such changes will be determined such that surface water use classifications are not jeopardized and surface water quality does not exceed standards at POCs.

2. Ground water plumes that can be shown to be stationary and do not therefore present a risk to surface water, regardless of their contaminant levels, will not require remediation or management. They will require continued monitoring to demonstrate that they remain stationary.

3.4 Ground Water Monitoring Network

- A. Ground water monitoring will be consistent with the Integrated Monitoring Plan which will be reviewed on an annual basis.
- B. All ground water monitoring data as well as changes in hydrologic conditions and exceedances of ground water standards will be reported quarterly and summarized annually to all parties.
- C. If quarterly reporting shows that previously uncontaminated wells are contaminated above ground water standards, the sampling frequency will be increased to monthly. Three consecutive monthly samples showing exceedances will trigger an evaluation to determine if a remedial or management action is necessary. If three consecutive monthly samples then show no exceedances, the sampling frequency will revert back to the frequency specified in the Integrated Monitoring Plan.
- D. All ground water plumes that exceed ground water standards must continue to be monitored until the need for institutional controls is mitigated.

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- E. All ground water remedies, as well as some soil remedies, will require ground water performance monitoring. The amount, frequency, and location of any performance monitoring will be based on the type of remedy implemented and will be determined on a case-by-case basis within decision documents. The remedy should also consider that surface water quality will be acceptable for all uses after active remediation.

3.5 Ground Water Classifications

- A. Three classifications currently apply to ground water at RFETS:
- Domestic Use Quality;
 - Agricultural Use Quality; and
 - Surface Water Protection.
- B. Because ground water use in all areas of the Site will be prevented, the domestic use and agricultural use classifications can be removed. Surface water protection standards for ground water are understood to be the applicable surface water standards.

4.0 SUBSURFACE SOIL

4.1 Basis for Action Levels

Subsurface soil is defined as soils deeper than six inches below the ground surface. Action levels for subsurface soil are protective of:

- human exposure appropriate for the land uses delineated on Figure 1;
- surface water standards via ground water transport; and
- ecological resources.

4.2 Action Levels

The subsurface soil action levels have been calculated using a two-tier approach.

A. Tier I

1. All subsurface soils capable of leaching contaminants to ground water at concentrations greater than or equal to 100 x MCLs. Where a MCL for a particular contaminant is lacking, the residential ground water ingestion-based PPRG value will apply.
2. Contaminant-specific Tier I action levels for volatile organic contaminants have been determined using a soil/water partitioning equation and a dilution factor from EPA's Draft Soil Screening Guidance (1994). These derived values and the parameters used to derive them are listed in Table 4 of this document. The subsurface media characteristics for these calculations are based on Site-Specific data or conservative values where representative RFETS values cannot be determined. Where subsurface characteristics in a particular area within RFETS differ significantly from those chosen as representative of the entire Site, those alternate values should be used. When refined parameters are agreed to by the parties, the derived values may need to be recalculated.
3. Table 4 also includes certain inorganic contaminants that may be of concern at RFETS. Contaminant-specific Tier I action levels for these targeted inorganic contaminants, including radionuclides, have not yet

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been included in Table 4, but are currently under development in a manner consistent with the action levels in 4.2.A.1 above. Table 4 will be updated to include these action levels as soon as they are developed.

B. Tier II

Additional subsurface soil may need to be remediated or managed to protect surface water quality via ground water transport or ecological resources. Subsurface soil presenting unacceptable ecological risks (hazard index [HI] ≥ 1) identified using the approved methodology will be evaluated for remediation or management.

4.3 Action Determinations

A. Tier I

When contaminant levels in subsurface soil exceed Tier I action levels, subsurface soil source removals will be triggered. These removals will be accomplished through accelerated actions.

B. Tier II

When an action is necessary to protect surface water or ecological resources, a process to identify, evaluate, and implement efficient, cost-effective, and feasible remediation or management actions will be triggered. Actions will consider the following:

- Actions will be developed in an integrated manner with other actions being taken;
- Actions will be consistent with best management practices;
- Actions may be accomplished by means of an interim or final action; and
- Remediation and/or management actions will be implemented to protect ecological resources where those actions can be implemented without damaging other ecological resources.

- C. Appropriate remedial or management actions will be determined through this evaluation process on a case-by-case basis, and may include the removal, treatment, disposal, or in-place stabilization of contaminated subsurface soils.
- D. Single geographically isolated data points of subsurface soil contamination above the Tier I or Tier II action levels will be evaluated for potential source magnitude. These single points will not necessarily trigger a source removal, remedial, or management action, depending on the source evaluation.

5.0 SURFACE SOIL

5.1 Basis for Action Levels

Surface soil will be defined as the upper six inches of soil. Action levels for surface soil are protective of:

- human exposure appropriate for the land uses delineated on Figure 1;
- surface water quality via runoff; and
- ecological resources.

5.2 Action Levels

The surface soil action levels have been calculated using a two-tier approach based on protection of appropriate human exposure.

A. Tier I

1. Action levels for non-radionuclides are human-health risk-based (carcinogenic risk equal to 10^{-4} and/or a HI of 1) for the appropriate land-use receptor. Table 5 presents the calculated action levels for these exposure scenarios:
 - a. Industrial Use Area (Area 1 on Figure 1): Action levels are based on Office Worker exposure as defined in the finalized PPRG document.
 - b. Restricted Open Space Area (Area 2 and 4 on Figure 1): Action levels are based on Open Space Recreational User exposure as defined in the finalized PPRG document.
2. Action levels for radionuclides will be the more conservative of:
 - a. Radiation dose limit of 15 mrem per year for the appropriate land use receptor, or
 - b. Human-health risk (carcinogenic risk equal to 10^{-4}) to the appropriate land-use receptor as described in Section 5.2.A.1

above. The calculated values associated with these exposure scenarios are listed in Table 5.

- c. The parties commit to expeditiously convene a working group to determine the derivation and application of the 15 mrem per year level as well as the derivation and potential application of the 75 mrem per year level.

B. Tier II

- 1. Action levels for radionuclides and non-radionuclides are human-health risk-based (carcinogenic risk of 10^{-6} and/or a HI of 1) for the appropriate land-use receptor. Table 5 presents the calculated action levels for these exposure scenarios:
 - a. Industrial Use Area (Area 1 on Figure 1): Action levels are based on Office Worker exposure as defined in the finalized PPRG document.
 - b. Restricted Open Space Area (Area 2 and 4 on Figure 1): Action levels are based on Open Space Recreational User exposure as defined in the finalized PPRG document.
- 2. Additional surface soil may need to be remediated or managed to protect surface water quality via runoff or ecological resources. The amount of soil and the protective remediation levels and/or management technique will be determined on a case-by-case basis. Surface soil presenting unacceptable ecological risks (a HI greater than or equal to 1) identified using the approved methodology will be evaluated for remediation or management.

5.3 Action Determinations

- A. When contaminant levels in surface soil exceed Tier I action levels a process to identify, evaluate and implement efficient, cost-effective, and feasible remediation or management actions will be triggered. Appropriate remedial or management actions will be determined through this process on a case-by-case basis, and may include the removal, treatment, disposal, or in-place stabilization of contaminated surface soils.

B. When contaminant levels in surface soil exceed Tier II action levels, they will be managed. Management may include, but is not limited to, "hotspot" removal, capping, or designating land uses that preclude unacceptable exposure. In addition, if aggregate risks at any source area exceed 10^{-4} , remedial action will be required. Actions will consider the following:

- Actions will be developed in an integrated manner with other actions being taken;
- Actions will be consistent with best management practices;
- Actions may be accomplished by means of an interim or final action; and
- Remediation and/or management actions will be implemented to protect ecological resources where those actions can be implemented without damaging other ecological resources.

Figure 1
Conceptual REETS Land Uses

- Explanation of Future Conditions
- Area 2: Unrestricted Open Space (1545 Acres)
 - Area 4: Restricted Open Space (Low level Rural Use for Limitation) (811 Acres)
 - Area 2: Restricted Open Space (760 Acres)
 - Area 3: Industrial Use Area (178 Acres)
 - Area 0: Potential Closed Area and Restricted Open Space (182 Acres)

Standard Map Features

- Buildings or other structures
- Lakes and ponds
- Fences
- Rocky Flats boundary
- Power roads
- Drain roads
- Streams, ditches, or other drainage features

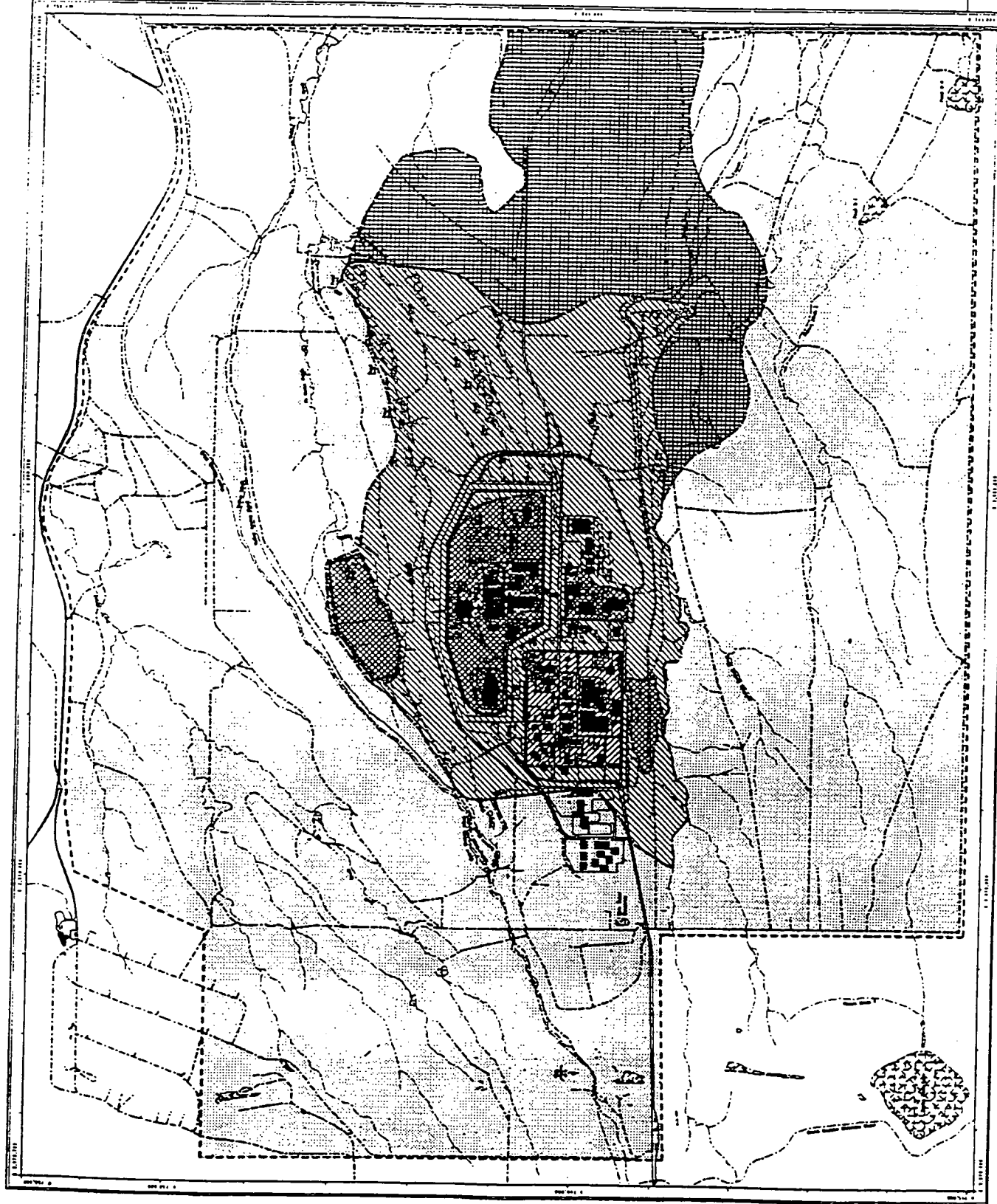
Scale: 1:25000
1 inch represents approximately 2487 feet
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Colorado Central Zone
Datum: NAD77

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Colorado Central Zone
Datum: NAD77

U.S. Department of Energy
Rocky Flats Environmental Technology Site
MAP ID: 412400
June 18, 1998



SUMMARY TABLE 1: ACTION LEVELS AND STANDARDS FRAMEWORK

SURFACE WATER - During Active Remediation (Near-Term Site Condition)

Surface Water		Action Levels (with temporary modifications, as appropriate)		Action	Point of Evaluation	Standards (with temporary modifications, as appropriate)		Action	Point of Compliance
	Segment 4					Non-Radionuclides: -Rec 2 -Agricultural -Aquatic Life Warm 2 -Water Supply (nitrate = 100 ppm)	Radionuclides: -Pu = 0.15 pCi/l -Am = 0.15 pCi/l -All other radionuclides = existing standards	Notification, source evaluation, mitigation if appropriate	Terminal Pond Outfalls and on Walnut and Woman Creeks at Indiana Street
	Segment 5	Non-Radionuclides: organics = MCLs inorganics/metals = -Rec 2 -Agricultural -Aquatic Life Warm 2 -Water Supply (nitrate = 100 ppm)	Radionuclides: -Pu = 0.15 pCi/l -Am = 0.15 pCi/l -All other radionuclides = existing standards	Notification, source evaluation mitigation if appropriate	Within ponds and in main stream channels, at existing monitoring stations				

SURFACE WATER - After Active Remediation (Intermediate and Long-Term Site Condition)

Surface Water		Action Levels (1)		Action	Point of Evaluation	Standards (2)		Action	Point of Compliance
	Segment 4					Non-Radionuclides: -Rec 2 -Agricultural -Aquatic Life Warm 2 -Water Supply	Radionuclides: -Pu = 0.15 pCi/l -Am = 0.15 pCi/l -All other radionuclides = existing standards	Notification, source evaluation, mitigation if appropriate	Terminal Pond Outfalls and on Walnut and Woman Creeks at Indiana Street; THD if ponds gone
	Segment 5					Non-Radionuclides: -Rec 2 -Agricultural -Aquatic Life Warm 2 -Water Supply	Radionuclides: -Pu = 0.15 pCi/l -Am = 0.15 pCi/l -All other radionuclides = existing standards	Notification, source evaluation mitigation if appropriate	Terminal Pond Outfalls and on Walnut and Woman Creeks at Indiana Street; THD if ponds gone

- (1) After active remediation, the concept of action levels in surface water will no longer be necessary. All action levels will either be discontinued or converted to enforceable standards.
- (2) Standards for Segment 4 and Segment 5 become identical when the period of active remediation is concluded.

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SUMMARY TABLE 1: ACTION LEVELS AND STANDARDS FRAMEWORK (continued)

OTHER MEDIA - During Active Remediation (Near-Term Site Condition)

Other Media	Tier I				Tier II			
	Action Level	Action	Cleanup Level	Point of Compliance	Action Level	Action	Cleanup Level	Point of Measurement
Ground Water	100 X MCLs ⁽¹⁾ and protection of surface water and ecological resources	Remedial or management action (accelerated)	Protective of surface water and ecological resources	None; applies across RFETS	MCL ⁽¹⁾	Plume evaluation, plume management if necessary	Protection of surface water and ecological resources	In designated Tier II ground water monitoring wells
Subsurface Soil	Protective of 100 X MCLs ⁽¹⁾ in ground water	Source removal (accelerated)	Protective of 100 X MCLs ⁽¹⁾ in ground water	None; applies across RFETS	Protection of surface water and ecological resources	Source evaluation, remediation/ management if appropriate	Protection of surface water and ecological resources.	Actual or predicted exceedances in surface water of surface water action levels or standards.
Surface Soil	10 ⁻⁴ carcinogenic risk for use scenarios QR 15 mrem/yr dose	Remediation (accelerated)	Protective of human health for use scenarios	None; applies across RFETS	10 ⁻⁴ carcinogenic risk and protection of surface water and ecological resources	Source evaluation, remediation/ management if appropriate	Protection of human health, surface water, and ecological resources	Human health, none (applies across RFETS); Surface water: actual or predicted exceedances in surface water of surface water action levels or standards.

(1) For chemicals without an MCL, residential ground water ingestion 10⁻⁴ "Programmatic Preliminary Remediation Goals" (PPRGs) will be used since they are the closest in derivation to MCLs.

OTHER MEDIA - After Active Remediation (Intermediate and Long-Term Site Condition)

The Action Level and Standards Framework will continue in effect until the need for land and water use control is mitigated. When the Intermediate Site Condition is achieved, on-going monitoring and maintenance of RFETS will continue. Should monitoring identify some off-normal contaminant migration event, decisions about any necessary remediation will be made consistent with the Action Levels and Standards Framework.

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Table 1 - Surface Water Action Levels & Standards

Analyte	CAS No.	Segment 4a & 4b Standards (mg/L)	Basis for Standard	Segment 5 Action Levels (mg/L)	Basis for Action Level	PQLs (a) (mg/L)
Acenaphthene (V)	83-32-9	5.20E-01	AL	2.19E+00	PPRG	1.00E-02
Acenaphthylene (V)	208-96-8	2.80E-06	W+F	2.80E-06	SEG 4	1.00E-02
Acetone (V)	67-64-1	-		3.65E+00	PPRG	
Acrolein	107-02-8	2.10E-02	AL	2.10E-02	SEG 4	1.00E-02
Acrylonitrile	107-13-1	5.80E-05	W+F	5.80E-05	SEG 4	5.00E-03
Alachlor	15972-60-8	2.00E-03	WS	2.00E-03	MCL	2.00E-03
Aldicarb	116-06-3	3.00E-03	WS	3.00E-03	SEG 4	1.00E-02
Aldicarb sulfone	1646-88-4	1.00E-03	WS	1.00E-03	SEG 4	3.00E-03
Aldicarb sulfoxide	1646-87-3	4.00E-03	WS	4.00E-03	SEG 4	3.00E-03
Aldrin	309-00-2	1.30E-07	W+F	5.00E-06	PPRG	1.00E-04
Aluminum, dissolved	7429-90-5	8.70E-02	BS	8.70E-02	BS	
Ammonia, unionized	7664-41-7	(b)	(b)	(b)	(b)	
Anthracene (V)	120-12-7	9.60E+00	W+F (d)	1.09E+01	PPRG	1.00E-03
Antimony, total recoverable	7440-36-0	6.00E-03	BS	6.00E-03	BS	
Aroclor-1016	12674-11-2	4.40E-08	W+F	5.00E-04	MCL	1.00E-03
Aroclor-1221	11104-28-2	4.40E-08	W+F	5.00E-04	MCL	1.00E-03
Aroclor-1232	11141-16-5	4.40E-08	W+F	5.00E-04	MCL	1.00E-03
Aroclor-1242	53469-21-9	4.40E-08	W+F	5.00E-04	MCL	1.00E-03
Aroclor-1248	12672-29-6	4.40E-08	W+F	5.00E-04	MCL	1.00E-03
Aroclor-1254	11097-69-1	4.40E-08	W+F	5.00E-04	MCL	1.00E-03
Aroclor-1260	11096-82-5	4.40E-08	W+F	5.00E-04	MCL	1.00E-03
Arsenic, total recoverable	7440-38-2	5.00E-02	SS	5.00E-02	SS	
Atrazine	1912-24-9	3.00E-03	WS	3.00E-03	MCL	1.00E-03
Barium, total recoverable	7440-39-3	1.00E+00	BS	1.00E+00	BS	
Benzene (V)	71-43-2	1.00E-03	BS	5.00E-03	MCL	1.00E-03
Benzidine	92-87-5	1.20E-07	W+F	1.20E-07	SEG 4	1.00E-03
alpha-BHC	319-84-6	3.90E-06	W+F	1.35E-05	PPRG	5.00E-05
beta-BHC	319-85-7	1.40E-05	W+F	4.72E-05	PPRG	5.00E-05
gamma-BHC (Lindane)	58-89-9	1.90E-05	W+F	2.00E-04	MCL	5.00E-05
Benzo(a)anthracene	56-55-3	4.40E-06	W+F (d)	1.16E-04	PPRG	1.00E-02
Benzo(a)pyrene	50-32-8	4.40E-06	W+F (d)	2.00E-04	MCL	2.00E-04
Benzo(b)fluoranthene	205-99-2	4.40E-06	W+F (d)	4.40E-06	SEG 4 (c)	1.00E-02
Benzo(g,h,i)perylene	191-24-2	4.40E-06	W+F (d)	4.40E-06	SEG 4 (d)	1.00E-02
Benzo(k)fluoranthene	207-08-9	4.40E-06	W+F (d)	4.40E-06	SEG 4 (d)	1.00E-02
Beryllium, total recoverable	7440-41-7	4.00E-03	SS	4.00E-03	SS	
bis(2-Chloroethyl)ether (V)	111-44-4	3.00E-05	SS	1.65E-05	PPRG	1.00E-03
bis(2-Chloroisopropyl)ether (V)	108-60-1	1.40E+00	W+F	4.22E-04	PPRG	1.00E-02
bis(Chloromethyl)ether	107-30-2	3.70E-09	SS	3.70E-09	SEG 4	
bis(2-Ethylhexyl)phthalate	117-81-7	1.80E-03	W+F	6.00E-03	MCL	6.00E-03
Boron, total	7440-42-8	7.50E-01	SS	7.50E-01	SS	
Bromodichloromethane (V)	75-27-4	1.00E-01	BS (c)	1.00E-01	SEG 4 (c)	1.00E-03
Bromoform (V)	75-25-2	1.00E-01	BS (c)	1.00E-01	SEG 4 (c)	1.00E-03
Bromomethane (V)	74-83-9	4.80E-02		1.09E-02	PPRG	1.00E-03
2-Butanone (V)	78-93-3	-		2.47E+00	PPRG	
Butylbenzylphthalate	85-68-7	3.00E+00	W+F	3.00E+00	SEG 4	1.00E-02
Cadmium, dissolved	7440-43-9	1.50E-03	SS	1.50E-03	SS	
Carbofuran	1563-66-2	3.60E-02	WS	4.00E-02	MCL	7.00E-03
Carbon disulfide (V)	75-15-0	-		2.76E-02	PPRG	
Carbon tetrachloride (V)	56-23-5	2.50E-04	W+F	5.00E-03	MCL	1.00E-03
Chlordane	5103-71-9	5.80E-07	W+F	2.00E-03	MCL	1.00E-03
Chlorobenzene (V)	108-90-7	1.00E-01	W+F	1.00E-01	MCL	5.00E-03

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Table1 - Surface Water Action Levels & Standards

Analyte	CAS No.	Segment 4a & 4b Standards (mg/L)	Basis for Standard	Segment 5 Action Levels (mg/L)	Basis for Action Level	PQLs (a) (mg/L)
Chloroethane (V)	75-00-3	-		2.78E+01	PPRG	
Chloroform (V)	67-66-3	1.00E-01	BS (c)	6.00E-03	SEG 4 (c)	1.00E-03
Chloromethane (V)	74-87-3	5.70E-03	W+F	2.32E-03	PPRG	
4-Chloro-3-methylphenol	59-50-7	3.00E-04	AL	3.00E-04	SEG 4	5.00E-02
2-Chloronaphthalene (V)	91-58-7	6.20E-01	AL	2.92E+00	PPRG	
2-Chlorophenol (V)	95-57-8	1.20E-01	W+F (c)	1.82E-01	PPRG	5.00E-02
Chloropyrifos	2921-88-2	4.10E-05	AL	4.10E-05	SEG 4	1.00E-04
Chromium III, Total Recoverable	7440-47-3	5.00E-02	SS	5.00E-02	SS	
Chromium VI, dissolved	7440-47-3	1.10E-02	SS	1.10E-02	SS	
Chrysene	218-01-9	4.40E-06	W+F (d)	1.16E-02	PPRG	1.00E-02
Copper, dissolved	7440-50-8	1.60E-02	SS	1.60E-02	SS	
Cyanide	57-12-5	5.00E-03	SS	5.00E-03	SS	
4,4-DDD	72-54-8	8.30E-07	W+F	3.54E-04	PPRG	1.00E-04
4,4-DDE	72-55-9	5.90E-07	W+F	2.50E-04	PPRG	1.00E-04
4,4-DDT	50-29-3	5.90E-07	W+F	2.50E-04	PPRG	1.00E-04
Dalapon	75-99-0	2.00E-01	WS	2.00E-01	MCL	1.30E-02
Demeton	8065-48-3	1.00E-04	AL	1.00E-04	SEG 4	1.00E-03
Dibenzo(a,h)anthracene	53-70-3	4.40E-06	W+F (d)	1.16E-05	PPRG	1.00E-02
Dibromochloromethane	124-48-1	1.00E-01	BS (d)	6.00E-03	PPRG	1.00E-03
1,2-Dibromo-3-chloropropane	96-12-8	2.00E-04	WS	2.00E-04	MCL	5.00E-05
Di-n-butylphthalate	84-74-0	2.70E-03	W+F	3.65E+00	PPRG	1.00E-02
2,4-D	94-75-7	7.00E-02	WS	7.00E-02	MCL	1.00E-03
1,2-Dichlorobenzene (V)	95-50-1	6.20E-01	W+F, WS	6.00E-01	MCL	1.00E-03
1,3-Dichlorobenzene (V)	541-73-1	4.00E-01	W+F	6.00E-01	MCL	1.00E-03
1,4-Dichlorobenzene (V)	106-46-7	7.50E-02	W+F, WS	7.50E-02	MCL	1.00E-03
3,3-Dichlorobenzidine	91-94-1	3.90E-05	W+F	1.89E-04	PPRG	1.00E-02
1,1-Dichloroethane (V)	107-06-2	-		1.01E+00	PPRG	1.00E-03
1,2-Dichloroethane (V)	107-06-2	4.00E-04	W+F	5.00E-03	MCL	1.00E-03
1,1-Dichloroethene (V)	75-35-4	5.70E-05	W+F	7.00E-03	MCL	1.00E-03
1,2-Dichloroethene (cis) (V)	156-59-2	7.00E-02	WS	7.00E-02	MCL	5.00E-03
2,4-Dichlorophenol	120-83-2	2.10E-02	W+F	1.10E-01	PPRG	5.00E-02
1,2-Dichloropropane (V)	78-87-5	5.60E-04	W+F	5.00E-03	MCL	1.00E-03
cis-1,3-Dichloropropene (V)	1006-01-5	-		1.27E-04	PPRG	1.00E-03
trans-1,3-Dichloropropene (V)	10061-02-6	-		1.27E-04	PPRG	1.00E-03
1,3-Dichloropropylene	542-75-6	1.00E-02	W+F	1.00E-02	SEG 4	
Dieldrin	60-57-1	1.40E-07	W+F	5.31E-06	PPRG	1.00E-03
Di(2-ethylhexyl)adipate	103-23-1	4.00E-01	WS	4.00E-01	MCL	6.00E-03
Diethylphthalate	84-66-2	2.30E+01	W+F	2.92E+01	PPRG	1.00E-02
Diisopropyl methyl phosphonate	1445-75-6	8.00E-03	WS	8.00E-03	SEG 4	1.00E-03
2,4-Dimethylphenol (V)	105-67-9	5.40E-01	W+F	7.30E-01	PPRG	5.00E-02
Dimethylphthalate	131-11-3	3.13E+02	W+F	3.65E+02	PPRG	1.00E-02
4,6-Dinitro-2-methylphenol (V)	534-52-1	1.30E-02	W+F	1.30E-02	SEG 4	5.00E-02
2,4-Dinitrophenol	51-28-5	1.40E-02	W+F, WS	7.30E-02	PPRG	5.00E-02
2,4-Dinitrotoluene	121-14-2	1.10E-04	W+F	7.30E-02	PPRG	1.00E-02
2,6-Dinitrotoluene	606-20-2	2.30E-01	W+F	1.25E-04	PPRG	1.00E-02
Dinoseb	88-85-7	7.00E-03	WS	7.00E-03	MCL	2.00E-03
Dioxin	1746-01-6	1.30E-11	W+F	3.00E-08	MCL	
1,2-Diphenylhydrazine	122-66-7	4.00E-05	W+F	4.00E-05	SEG 4	
Diquat	65-00-7	2.00E-02	WS	2.00E-02	MCL	4.00E-03
Endosulfan	115-29-7	5.60E-05	AL	2.19E-01	PPRG	1.00E-04
Endosulfan sulfate	1031-07-8	1.10E-01	W+F	2.19E-01	PPRG	1.00E-04

Table1 - Surface Water Action Levels & Standards

Analyte	CAS No.	Segment 4a & 4b Standards (mg/L)	Basis for Standard	Segment 5 Action Levels (mg/L)	Basis for Action Level	PQLs (a) (mg/L)
Endothall	145-73-3	1.00E-01	WS	1.00E-01	MCL	9.00E-02
Endrin (technical)	72-26-8	2.30E-06		2.00E-03	MCL	1.00E-04
Endrin aldehyde	7421-93-4	2.00E-04	W+F, WS	2.00E-04	SEG 4	1.00E-04
Ethylbenzene (V)	100-41-4	6.80E-01	W+F	7.00E-01	MCL	1.00E-02
Ethylene dibromide	106-93-4	5.00E-05	WS	5.00E-05	MCL	
Fluoranthene	206-44-0	3.00E-01	W+F (d)	1.46E+00	PPRG	1.00E-02
Fluorene (V)	86-73-7	1.30E+00	W+F (d)	1.46E+00	PPRG	1.00E-02
Fluoride	16984-48-8	2.00E+00	BS	2.00E+00	SEG 4	
Glyphosate	1071-83-6	7.00E-01		7.00E-01	MCL	6.00E-02
Guthion	86-50-0	1.00E-05	AL	1.00E-05	SEG 4	1.50E-03
Heptachlor	76-44-8	2.10E-07	W+F	4.00E-04	MCL	5.00E-05
Heptachlor epoxide	1024-57-3	1.00E-07	W+F	2.00E-04	MCL	5.00E-05
Hexachlorobenzene	118-74-1	7.50E-07	W+F	1.00E-03	MCL	1.00E-03
Hexachlorobutadiene	87-68-3	4.50E-04	W+F	1.09E-03	PPRG	1.00E-02
Hexachlorocyclohexane, Technical	608-73-1	1.20E-05	W+F	1.20E-05	SEG 4	2.00E-04
Hexachlorocyclopentadiene	77-47-4	5.00E-03	AL	5.00E-02	MCL	1.00E-03
Hexachloroethane	67-72-1	1.90E-03	W+F	6.70E-03	PPRG	1.00E-02
Indeno(1,2,3-cd)pyrene	193-39-5	4.40E-06	W+F (d)	1.16E-04	PPRG	1.00E-02
Iron, total recoverable	7439-89-6	1.00E+00	SS	1.00E+00	SS	
Isophorone	78-59-1	3.60E-02	W+F	8.95E-02	PPRG	1.00E-02
Lead, dissolved	7439-92-1	6.50E-03	SS	6.50E+00	SS	
Malathion	121-75-4	1.00E-04	AL	1.00E-04	SEG 4	2.00E-04
Manganese, total recoverable	7439-96-5	1.00E+00	SS	1.00E+00	SS	
Mercury, total	7439-97-6	1.00E-05	SS	1.00E-05	SS	
Methoxychlor	72-43-5	3.00E-05	W+F	4.00E-02	MCL	5.00E-04
Methylene chloride (V)	75-09-2	5.00E-03	W+F, WS	5.00E-03	MCL	
4-Methyl-2-pentanone (V)	108-10-1	-		2.03E-01	PPRG	
2-Methylphenol	95-48-7	-		1.83E+00	PPRG	
Mirex	2385-85-5	1.00E-06	AL	1.00E-06	SEG 4	1.00E-04
Naphthalene (V)	91-20-3	6.20E-01	AL (d)	1.46E+00	PPRG	1.00E-02
Nickel, dissolved	7440-02-0	1.23E-01	SS	1.23E-01	SS	
Nitrate	14797-55-8	1.00E+02	AG (e)	1.00E+01	SEG 4 (e)	
Nitrite	14797-65-0	4.50E+00	AL (e)	4.50E+00	SEG 4 (e)	
Nitrobenzene (V)	98-95-3	3.50E-03	W+F, WS	4.20E-03	PPRG	1.00E-02
Nitrosodibutylamine N		6.40E-06	W+F	6.40E-06	SEG 4	1.00E-02
Nitrosodiethylamine N		8.00E-07	W+F	8.00E-07	SEG 4	1.00E-02
Nitrosodimethylamine N	62-75-9	6.90E-07	W+F	6.90E-07	SEG 4	1.00E-02
n-Nitrosodiphenylamine (V)	86-30-6	5.00E-03	W+F (d)	1.73E-02	PPRG	1.00E-02
n-Nitrosodipropylamine	621-64-7	5.00E-06	W+F	1.21E-05	PPRG	1.00E-02
Nitrosopyrrolidine N		1.60E-05	W+F	1.60E-05	SEG 4	1.00E-02
Oxamyl(vydate)	23135-22-0	2.00E-01	WS	2.00E-01	MCL	2.00E-02
Parathion	56-38-2	4.00E-04	SS	4.00E-04	SEG 4	
Pentachlorobenzene	608-93-5	3.50E-03	W+F	3.50E-03	SEG 4	1.00E-02
Pentachlorophenol	87-86-5	2.80E-04	W+F	1.00E-03	MCL	1.00E-03
Phenanthrene (V)	85-01-8	2.80E-06	W+F	2.80E-06	SEG 4	1.00E-02
Phenol	108-95-2	2.56E+00	AL	2.19E+01	PPRG	5.00E-02
Picloram	1918-02-1	5.00E-01	WS	5.00E-01	MCL	1.00E-03
Pyrene	129-00-0	9.60E-01	W+F (d)	1.10E+00	PPRG	1.00E-02
Selenium, dissolved	7782-49-2	5.00E-03	AL	5.00E-03	SEG 4	
Silver, dissolved	7440-22-4	6.00E-04	SS	6.00E-04	SS	
Simazine	122-34-9	4.00E-03	WS	4.00E-03	MCL	7.00E-04

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Table 1 - Surface Water Action Levels & Standards

Analyte	CAS No.	Segment 4a & 4b Standards (mg/L)	Basis for Standard	Segment 5 Action Levels (mg/L)	Basis for Action Level	PQLs (a) (mg/L)
Sulfide	18496-25-8	2.00E-03	SS	2.00E-03	SS	
Styrene (V)	100-42-5	1.00E-01	WS	1.00E-01	MCL	5.00E-03
1,2,4,5-Tetrachlorobenzene	95-94-3	2.00E-03	WS	2.00E-03	SEG 4	1.00E-02
1,1,2,2-Tetrachloroethane (V)	79-34-5	1.70E-04	W+F	8.95E-05	PPRG	1.00E-03
Tetrachloroethene (V)	127-18-4	8.00E-04	W+F	5.00E-03	MCL	1.00E-03
Toluene (V)	108-88-3	1.00E+00	W+F, WS	1.00E+00	MCL	5.00E-03
Toxaphene	8001-35-2	2.00E-07	AL	3.00E-03	MCL	3.00E-03
1,2,4-Trichlorobenzene (V)	120-82-1	5.00E-02	AL	7.00E-02	MCL	5.00E-03
1,1,1-Trichloroethane (V)	71-55-6	2.00E-01	W+F, WS	2.00E-01	MCL	5.00E-03
1,1,2-Trichloroethane (V)	79-00-5	6.00E-04	W+F	5.00E-03	MCL	1.00E-03
Trichloroethene (V)	79-01-6	2.70E-03	W+F	5.00E-03	MCL	1.00E-03
2,4,6-Trichlorophenol	88-06-2	2.00E-03	W+F, WS	7.73E-03	PPRG	5.00E-02
Trichlorophenoxypropionic acid	93-72-1	5.00E-02	WS	5.00E-02	SEG 4	5.00E-03
Vinyl chloride (V)	75-01-4	2.00E-03	W+F, WS	2.00E-03	MCL	2.00E-03
Xylene (total) (V)	1330-20-7	1.00E+01	WS	1.00E+01	MCL	5.00E-03
Zinc, dissolved	7440-66-6	1.41E-01	SS	1.41E-01	SS	
PHYSICAL PARAMETERS:						
Dissolved oxygen (minimum)		5.0 mg/L	SS	5.0 mg/L	SS	
pH		6.5-9.0	SS	6.5-9.0	SS	
RADIOLOGIC PARAMETERS:						
		Woman Creek (pCi/L)		Walnut Creek (pCi/L)		
Americium 241, total	14596-10-2	1.50E-01	BS (d)	1.50E-01	BS (d)	
Plutonium 239 and 240, total	10-12-8	1.50E-01	BS (d)	1.50E-01	BS (d)	
Radium 226 and 228, total	13982-63-3	5.00E+00	BS	5.00E+00	BS	
Strontium 90, total	11-10-9	8.00E+00	BS	8.00E+00	BS	
Tritium	10028-17-8	5.00E+02	SS	5.00E+02	SS	
Uranium, total	7440-61-1	1.10E+01	SS (d)	1.00E+01	SS (d)	
Gross Alpha, total	14127-62-9	7.00E+00	SS	1.10E+01	SS	
Gross Beta, total	12587-47-2	8.00E+00	SS (d)	1.90E+01	SS (d)	

- (a) Whenever the practical quantitation level (PQL) for a pollutant is higher (less stringent) than a standard and/or an action level, "less than" the PQL shall be used as the compliance threshold. These less stringent PQLs are bolded.
- (b) There is no unionized ammonia standard for Segment 5 or Segment 4b. A standard of 0.1 mg/L applies to Segment 4a which begins in Walnut Creek downstream of Indiana Street.
- (c) Per the Basic Standards, the Total Trihalomethane (TTHM) standard applies to the sum of the four TTHM compounds.
- (d) These values represent changes from the current standards and must be proposed to the WQCC to become final. Standards listed for organics are consistent with the current applicable state-wide Basic Standards.
- (e) These values represent changes from the current standards and must be approved by the WQCC to become final. The listed nitrate value is the agriculture use standard. The listed nitrite value is the chronic aquatic life standard based on chloride levels in excess of 22 mg/L in Segment 4.

Standards for chloride, dissolved iron, dissolved manganese, and sulfate are Secondary Drinking Water Standards which are based on aesthetic considerations. They have been removed as site-specific standards since Segments 4 and 5 waters will not be used for drinking water supply.

Metals standards which are based on a toxicity equation use a hardness value of 143 mg/L.

ACRONYMS: AG = Agriculture; AL = Aquatic Life; BS = Basic Standard; SS = Site Specific Standard; WS = Water Supply;
W+F = Water plus Fish; MCL = Maximum Contaminant Level; PPRG = Preliminary Programmatic Remediation Goal;
SEG 4 = organic value set equal to the Segment 4 standard where an MCL and PPRG are lacking; (V) = volatile chemical.

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Table 2 - Ground Water Action Levels

Analyte	CAS No.	Tier 1- 100 x MCLs (mg/L)	Tier 2- MCLs (mg/L)
Acenaphthene (V)	83-32-9	2.19E+02	2.19E+00
Acetone (V)	67-64-1	3.65E+02	3.65E+00
Aldrin	309-00-2	5.00E-04	5.00E-06
Aluminum	7429-90-5	1.06E+04	1.06E+02
Anthracene (V)	120-12-7	1.10E+03	1.10E+01
Antimony	7440-36-0	6.00E-01	6.00E-03
Aroclor-1016	12674-11-2	5.00E-02	5.00E-04
Aroclor-1221	11104-28-2	5.00E-02	5.00E-04
Aroclor-1232	11141-16-5	5.00E-02	5.00E-04
Aroclor-1242	53469-21-9	5.00E-02	5.00E-04
Aroclor-1248	12672-29-6	5.00E-02	5.00E-04
Aroclor-1254	11097-69-1	5.00E-02	5.00E-04
Aroclor-1260	11096-82-5	5.00E-02	5.00E-04
Arsenic	7440-38-2	5.00E+00	5.00E-02
Barium	7440-39-3	2.00E+02	2.00E+00
Benzene (V)	71-43-2	5.00E-01	5.00E-03
alpha-BHC	319-84-6	1.35E-03	1.35E-05
beta-BHC	319-85-7	4.72E-03	4.72E-05
gamma-BHC (Lindane)	58-89-9	2.00E-02	2.00E-04
Benzo(a)anthracene	56-55-3	1.16E-02	1.16E-04
Benzo(a)pyrene	50-32-8	2.00E-02	2.00E-04
Benzo(b)fluoranthene	205-99-2	1.16E-02	1.16E-04
Benzo(k)fluoranthene	207-08-9	1.16E-01	1.16E-03
Benzoic Acid	65-85-0	1.46E+04	1.46E+02
Benzyl Alcohol	100-51-6	1.10E+03	1.10E+01
Beryllium	7440-41-7	4.00E-01	4.00E-03
bis(2-Chloroethyl)ether (V)	111-44-4	1.63E-03	1.63E-05
bis(2-Chloroisopropyl)ether (V)	108-60-1	4.22E-02	4.22E-04
bis(2-Ethylhexyl)phthalate	117-81-7	6.00E-01	6.00E-03
Bromodichloromethane (V)	75-27-4	1.00E+01	1.00E-01
Bromoform (V)	75-25-2	1.00E+01	1.00E-01
Bromomethane (V)	74-83-9	1.09E+00	1.09E-02
2-Butanone (V)	78-93-3	2.47E+02	2.47E+00
Butylbenzylphthalate	85-68-7	7.30E+02	7.30E+00
Cadmium	7440-43-9	5.00E-01	5.00E-03
Carbon disulfide (V)	75-15-0	2.76E+00	2.76E-02
Carbon tetrachloride (V)	56-23-5	5.00E-01	5.00E-03
alpha-Chlordane	5103-71-9	2.00E-01	2.00E-03
beta-Chlordane	5103-74-2	2.00E-01	2.00E-03
gamma-Chlordane	5103-74-2	2.00E-01	2.00E-03
4-Chloroaniline	106-47-8	1.46E+01	1.46E-01
Chlorobenzene (V)	108-90-7	1.00E+01	1.00E-01
Chloroethane (V)	75-00-3	2.78E+03	2.78E+01
Chloroform (V)	67-66-3	1.00E+01	1.00E-01
Chloromethane (V)	74-87-3	2.32E-01	2.32E-03
2-Chloronaphthalene (V)	91-58-7	2.92E+02	2.92E+00
2-Chlorophenol (V)	95-57-8	1.83E+01	1.83E-01
Chromium	7440-47-3	1.00E+01	1.00E-01
Chrysene	218-01-9	1.16E+00	1.16E-02
Cobalt	7440-48-4	2.19E+02	2.19E+00

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Table 2 - Ground Water Action Levels

Analyte	CAS No.	Tier 1- 100 x MCLs (mg/L)	Tier 2- MCLs (mg/L)
Copper	7440-50-8	1.30E+02	1.30E+00
Cyanide	57-12-5	2.00E+01	2.00E-01
4,4-DDD	72-54-8	3.54E-02	3.54E-04
4,4-DDE	72-55-9	2.50E-02	2.50E-04
4,4-DDT	50-29-3	2.50E-02	2.50E-04
Dalapon	75-99-0	2.00E+01	2.00E-01
Dibenz(a,h)anthracene	53-70-3	1.16E-03	1.16E-05
Dibromochloromethane	124-48-1	1.01E-01	1.01E-03
1,2-Dibromo-3-chloropropane	96-12-8	2.00E-02	2.00E-04
Di-n-butylphthalate	84-74-0	3.65E+02	3.65E+00
2,4-D	94-75-7	7.00E+00	7.00E-02
1,2-Dichlorobenzene (V)	95-50-1	6.00E+01	6.00E-01
1,3-Dichlorobenzene (V)	541-73-1	6.00E+01	6.00E-01
1,4-Dichlorobenzene (V)	106-46-7	7.50E+00	7.50E-02
3,3-Dichlorobenzidine	91-94-1	1.89E-02	1.89E-04
1,1-Dichloroethane (V)	107-06-2	1.01E+02	1.01E+00
1,2-Dichloroethane (V)	107-06-2	5.00E-01	5.00E-03
1,1-Dichloroethene (V)	540-59-0	7.00E-01	7.00E-03
1,2-Dichloroethene (total)(V)	540-59-0	7.00E+00	7.00E-02
2,4-Dichlorophenol	120-83-2	1.10E+01	1.10E-01
1,2-Dichloropropane (V)	78-87-5	5.00E-01	5.00E-03
cis-1,3-Dichloropropene (V)	1006-01-5	1.27E-02	1.27E-04
trans-1,3-Dichloropropene (V)	10061-02-6	1.27E-02	1.27E-04
Dieldrin	60-57-1	5.31E-04	5.31E-06
Diethylphthalate	84-66-2	2.92E+03	2.92E+01
2,4-Dimethylphenol (V)	105-67-9	7.30E+01	7.30E-01
Dimethylphthalate	131-11-3	3.65E+04	3.65E+02
2,4-Dinitrophenol	51-28-5	7.30E+00	7.30E-02
2,4-Dinitrotoluene	121-14-2	7.30E+00	7.30E-02
2,6-Dinitrotoluene	606-20-2	1.25E-02	1.25E-04
Di-n-octylphthalate	117-84-0	7.30E+01	7.30E-01
Endosulfan I	959-98-8	2.19E+01	2.19E-01
Endosulfan II	33213-65-9	2.19E+01	2.19E-01
Endosulfan sulfate	1031-07-8	2.19E+01	2.19E-01
Endosulfan (technical)	115-29-7	2.19E+01	2.19E-01
Endrin (technical)	72-26-8	2.00E-01	2.00E-03
Ethylbenzene (V)	100-41-4	7.00E+01	7.00E-01
Fluoranthene	206-44-0	1.46E+02	1.46E+00
Fluorene (V)	86-73-7	1.46E+02	1.46E+00
Fluoride	16984-48-8	4.00E+02	4.00E+00
Glyphosate	1071-83-6	7.00E+01	7.00E-01
Heptachlor	76-44-8	4.00E-02	4.00E-04
Heptachlor epoxide	1024-57-3	2.00E-02	2.00E-04
Hexachlorobenzene	118-74-1	1.00E-01	1.00E-03
Hexachlorobutadiene	87-68-3	1.09E-01	1.09E-03
Hexachlorocyclopentadiene	77-47-4	5.00E+00	5.00E-02
Hexachloroethane	67-72-1	6.07E-01	6.07E-03
Indeno(1,2,3-cd)pyrene	193-39-5	1.16E-02	1.16E-04
Isophorone	78-59-1	8.95E+00	8.95E-02
Lithium	7439-93-2	7.30E+01	7.30E-01

Table 2 - Ground Water Action Levels

Analyte	CAS No.	Tier 1-	Tier 2-
		100 x MCLs (mg/L)	MCLs (mg/L)
Manganese	7439-96-5	1.83E+01	1.83E-01
Mercury	7439-97-6	2.00E-01	2.00E-03
Methoxychlor	72-43-5	4.00E+00	4.00E-02
Methylene chloride (V)	75-09-2	5.00E-01	5.00E-03
4-Methyl-2-pentanone (V)	108-10-1	2.03E+01	2.03E-01
2-Methylphenol	95-48-7	1.83E+02	1.83E+00
Molybdenum	7439-98-7	1.83E+01	1.83E-01
Naphthalene (V)	91-20-3	1.46E+02	1.46E+00
Nickel	7440-02-0	1.00E+01	1.00E-01
Nitrate (MCL as N)	1-005	1.00E+03	1.00E+01
Nitrite (MCL as N)	1-005	1.00E+02	1.00E+00
Nitrobenzene (V)	98-95-3	4.20E-01	4.20E-03
n-Nitrosodiphenylamine (V)	86-30-6	1.73E+00	1.73E-02
n-Nitrosodipropylamine	621-64-7	1.21E-03	1.21E-05
Pentachlorophenol	87-86-5	1.00E-01	1.00E-03
Phenol	108-95-2	2.19E+03	2.19E+01
Pyrene	129-00-0	1.10E+02	1.10E+00
Selenium	7782-49-2	5.00E+00	5.00E-02
Silver	7440-22-4	1.83E+01	1.83E-01
Strontium	7440-24-6	2.19E+03	2.19E+01
Styrene (V)	100-42-5	1.00E+01	1.00E-01
Sulfate	14808-79-8	5.00E+04*	5.00E+02*
1,1,2,2-Tetrachloroethane (V)	79-34-5	8.95E-03	8.95E-05
Tetrachloroethene (V)	127-18-4	5.00E-01	5.00E-03
Thallium	7440-28-0	2.00E-01	2.00E-03
Tin	7440-31-5	2.19E+03	2.19E+01
Toluene (V)	108-88-3	1.00E+02	1.00E+00
Toxaphene	8001-35-2	3.00E-01	3.00E-03
1,2,4-Trichlorobenzene (V)	120-82-1	7.00E+00	7.00E-02
1,1,1-Trichloroethane (V)	71-55-6	2.00E+01	2.00E-01
1,1,2-Trichloroethane (V)	79-00-5	5.00E-01	5.00E-03
Trichloroethene (V)	79-01-6	5.00E-01	5.00E-03
2,4,5-Trichlorophenol	95-95-4	5.00E+00	5.00E-02
2,4,6-Trichlorophenol	88-06-2	7.73E-01	7.73E-03
Vanadium	7440-62-2	2.56E+01	2.56E-01
Vinyl acetate	108-05-4	3.65E+03	3.65E+01
Vinyl chloride (V)	75-01-4	2.00E-01	2.00E-03
Xylene (total)(V)	1330-20-7	1.00E+03	1.00E+01
Zinc	7440-66-6	1.10E+03	1.10E+01

Analytes without an MCL value list the corresponding residential ground water ingestion

Preliminary Programmatic Remediation Goal (PPRG) which is shown in bold italics.

Analytes without an MCL or a PPRG value are not listed.

(V) = Volatile chemicals

* Based on proposed MCL

Table 2 - Ground Water Action Levels

Analyte	CAS No.	Tier 1-	Tier 2-
		100 x MCLs (pCi/L)	MCLs (pCi/L)
RADIOLOGIC PARAMETERS:			
Americium-241	14596-10-2	1.45E+01	1.45E-01
Cesium-137+D	10045-97-3	1.51E+02	1.51E+00
Plutonium-239	10-12-8	1.51E+01	1.51E-01
Plutonium-240	10-12-8	1.51E+01	1.51E-01
Radium-226+D	13982-63-3	2.00E+03*	2.00E+01*
Radium-228+D	15262-20-1	2.00E+03*	2.00E+01*
Strontium-89	11-10-9	4.62E+02	4.62E+00
Strontium-90+D	11-10-9	8.52E+01	8.52E-01
Tritium	10028-17-8	6.66E+04	6.66E+02
Uranium-233+D	11-08-5	2.98E+02	2.98E+00
Uranium-234	11-08-5	1.07E+02	1.07E+00
Uranium-235+D	15117-96-1	1.01E+02	1.01E+00
Uranium-238+D	7440-61-1	7.68E+01	7.68E-01

D = Daughters

* Based on proposed MCL

TABLE 3
Tier II Ground Water Monitoring Wells
for Volatile Organic Compounds

Location Code
6586
75992
06091
10194
1986
P314289
P313589
7086
10992
1786
1386
10692
4087
B206989
New well (upstream of 6586)
New well (between ponds B-2 and B-3)
New well (downgradient of Ryan's Pit near pond C-1)

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Table 4 - Tier I Subsurface Soil Action Levels

Analyte	CAS No.	Henry's Constant	Kd	Dilution Factor	Calculated Leachability at Tier I Ground Water Action Levels (mg/kg)
Acenaphthene (V)	83-32-9	7.54E-03	14.21	7.8	2.47E+04
Acetone (V)	67-64-1	1.18E-03	0.80	7.8	2.74E+03
Aldrin	309-00-2	4.22E-03	114.25	7.8	4.48E-01
Aluminum	7429-90-5			7.8	TBD
Anthracene (V)	120-12-7	4.55E-03	8.81	7.8	7.73E+04
Antimony	7440-36-0			7.8	TBD
Aroclor-1016	12674-11-2	4.39E-02	241.87	7.8	9.50E+01
Aroclor-1221	11104-28-2	4.39E-02	1173.39	7.8	4.60E+02
Aroclor-1232	11141-16-5	4.39E-02	1173.39	7.8	4.60E+02
Aroclor-1242	53469-21-9	4.39E-02	1173.39	7.8	4.60E+02
Aroclor-1248	12672-29-6	4.39E-02	1173.39	7.8	4.60E+02
Aroclor-1254	11097-69-1	4.39E-02	1790.01	7.8	7.01E+02
Aroclor-1260	11096-82-5	4.39E-02	9746.45	7.8	3.82E+03
Arsenic	7440-38-2			7.8	TBD
Barium	7440-39-3			7.8	TBD
Benzene (V)	71-43-2	2.24E-01	1.88	7.8	8.08E+00
alpha-BHC	319-84-6	2.78E-04	7.11	7.8	7.69E-02
beta-BHC	319-85-7	1.42E-05	8.28	7.8	3.12E-01
gamma-BHC (Lindane)	58-89-9	1.39E-04	6.15	7.8	1.07E+00
Benzo(a)anthracene	56-55-3	1.48E-04	791.73	7.8	7.19E+01
Benzo(a)pyrene	50-32-8	3.43E-05	2022.64	7.8	3.17E+02
Benzo(b)fluoranthene	205-99-2	2.53E-04	1949.54	7.8	1.77E+02
Benzo(k)fluoranthene	207-08-9	1.62E-03	1217.44	7.8	1.11E+03
Benzoic Acid	65-85-0			7.8	TBD
Benzyl Alcohol	100-51-6			7.8	TBD
Beryllium	7440-41-7			7.8	TBD
bis(2-Chloroethyl)ether (V)	111-44-4	8.77E-04	1.46	7.8	2.06E-02
bis(2-Chloroisopropyl)ether (V)	108-60-1	4.63E-03	1.05	7.8	4.01E-01
bis(2-Ethylhexyl)phthalate	117-81-7	3.43E-04	197.76	7.8	9.32E+02
Bromodichloromethane (V)	75-27-4	1.30E-01	1.80	7.8	1.96E+02
Bromoform (V)	75-25-2	2.52E-02	1.59	7.8	1.79E+02
Bromomethane (V)	74-83-9	5.82E-01	1.22	7.8	1.24E+01
2-Butanone (V)	78-93-3			7.8	TBD
Butylbenzylphthalate	85-68-7	7.83E-05	79.05	7.8	4.53E+05
Cadmium	7440-43-9			7.8	TBD
Carbon disulfide (V)	75-15-0	5.21E-01	1.78	7.8	4.32E+01
Carbon tetrachloride (V)	56-23-5	1.18E+00	2.53	7.8	1.10E+01
alpha-Chlordane	5103-71-9	2.73E-03	120.00	7.8	1.89E+02
beta-Chlordane	5103-74-2	2.73E-03	120.00	7.8	1.89E+02
gamma-Chlordane	5103-74-2	2.73E-03	120.00	7.8	1.89E+02
4-Chloroaniline	106-47-8	4.80E-05	1.68	7.8	2.10E+02
Chlorobenzene (V)	108-90-7	4.80E-05	2.68	7.8	2.64E+02
Chloroethane (V)	75-00-3	3.48E-01	1.42	7.8	3.53E+04
Chloroform (V)	67-66-3	1.65E-01	1.76	7.8	1.52E+02
Chloromethane (V)	74-87-3	9.72E-02	1.13	7.8	2.36E+00
2-Chloronaphthalene (V)	91-58-7			7.8	TBD
2-Chlorophenol (V)	95-57-8	5.33E-04	1.18	7.8	2.82E+02
Chromium	7440-47-3			7.8	TBD
Chrysene	218-01-9	4.96E-05	693.95	7.8	6.30E+03
Cobalt	7440-48-4			7.8	TBD

142/724

Table 4 - Tier I Subsurface Soil Action Levels

Analyte	CAS No.	Henry's Constant	Kd	Dilution Factor	Calculated Leachability at Tier I Ground Water Action Levels (mg/kg)
Copper	7440-50-8			7.8	TBD
Cyanide	57-12-5			7.8	TBD
4,4-DDD	72-54-8	3.26E-04	1701.84	7.8	4.72E+02
4,4-DDE	72-55-9	2.79E-03	9690.52	7.8	1.90E+03
4,4-DDT	50-29-3	2.10E-02	542.41	7.8	1.06E+02
Dalapon	75-99-0			7.8	TBD
Dibenzo(a,h)anthracene	53-70-3	4.59E-07	3979.74	7.8	3.61E+01
Dibromochloromethane	124-48-1			7.8	TBD
1,2-Dibromo-3-chloropropane	96-12-8			7.8	TBD
Di-n-butylphthalate	84-74-0	5.86E-05	7.54	7.8	2.20E+03
2,4-D	94-75-7			7.8	TBD
1,2-Dichlorobenzene (V)	95-50-1	8.61E-02	3.67	7.8	2.05E+03
1,3-Dichlorobenzene (V)	541-73-1			7.8	TBD
1,4-Dichlorobenzene (V)	106-46-7	1.15E-01	3.94	7.8	2.72E+02
3,3-Dichlorobenzidine	91-94-1	8.53E-07	8.35	7.8	1.26E+00
1,1-Dichloroethane (V)	107-06-2	7.54E-03	1.66	7.8	1.44E+03
1,2-Dichloroethane (V)	107-06-2	5.25E-02	1.45	7.8	6.33E+00
1,1-Dichloroethene (V)	540-59-0	1.04E+00	1.89	7.8	1.19E+01
1,2-Dichloroethene (total)(V)	540-59-0	2.29E-01	1.55	7.8	9.51E+00
2,4-Dichlorophenol	120-83-2	1.13E-04	3.16	7.8	2.86E+02
1,2-Dichloropropane (V)	78-87-5	1.15E-01	1.82	7.8	9.83E+00
cis-1,3-Dichloropropene (V)	1006-01-5	1.21E-01	1.58	7.8	1.74E-01
trans-1,3-Dichloropropene (V)	10061-02-6	1.21E-01	1.58	7.8	1.74E-01
Dieldrin	60-57-1	1.09E-04	29.44	7.8	1.20E-01
Diethylphthalate	84-66-2	2.24E-05	2.07	7.8	5.10E+04
2,4-Dimethylphenol (V)	105-67-9	2.46E-05	1.59	7.8	1.00E+03
Dimethylphthalate	131-11-3	2.37E-05	1.56	7.8	4.91E+05
2,4-Dinitrophenol	51-28-5	2.64E-08	1.42	7.8	9.05E+01
2,4-Dinitrotoluene	121-14-2	6.03E-06	1.78	7.8	1.11E+02
2,6-Dinitrotoluene	606-20-2	5.33E-06	1.69	7.8	1.81E-01
Di-n-octylphthalate	117-84-0	3.14E-05	2156204.19	7.8	>1E+06
Endosulfan I	959-98-8	9.47E-04	4.50	7.8	7.99E+02
Endosulfan II	33213-65-9	9.47E-04	4.50	7.8	7.99E+02
Endosulfan sulfate	1031-07-8			7.8	TBD
Endosulfan (technical)	115-29-7	9.47E-04	4.50	7.8	7.99E+02
Endrin (technical)	72-26-8	4.88E-05	3.01	7.8	5.80E+00
Ethylbenzene (V)	100-41-4	3.18E-01	3.01	7.8	1.76E+03
Fluoranthene	206-44-0	3.83E-04	113.21	7.8	1.30E+05
Fluorene (V)	86-73-7	2.99E-03	21.22	7.8	5.44E+04
Fluoride	16984-48-8			7.8	TBD
Glyphosate	1071-83-6			7.8	TBD
Heptachlor	76-44-8	2.41E-02	20.05	7.8	6.50E+00
Heptachlor epoxide	1024-57-3	3.40E-04	20.51	7.8	3.32E+00
Hexachlorobenzene	118-74-1	2.19E-02	88.56	7.8	6.99E+01
Hexachlorobutadiene	87-68-3	9.80E-01	19.94	7.8	1.73E+01
Hexachlorocyclopentadiene	77-47-4	7.05E-01	25.96	7.8	1.04E+03
Hexachloroethane	67-72-1	1.48E-01	7.49	7.8	3.64E+01
Indeno(1,2,3-cd)pyrene	193-39-5	1.99E-07	9612.54	7.8	8.73E+02
Isophorone	78-59-1	2.54E-04	1.56	7.8	1.20E+02
Lithium	7439-93-2			7.8	TBD

Table 4 - Tier I Subsurface Soil Action Levels

Analyte	CAS No.	Henry's Constant	Kd	Dilution Factor	Calculated Leachability at Tier I Ground Water Action Levels (mg/kg)
Manganese	7439-96-5			7.8	<i>TBD</i>
Mercury	7439-97-6			7.8	<i>TBD</i>
Methoxychlor	72-43-5	2.60E-04	175.69	7.8	2.52E+04
Methylene chloride (V)	75-09-2	9.70E-02	1.30	7.8	5.77E+00
4-Methyl-2-pentanone (V)	108-10-1	3.85E-03	1.28	7.8	2.29E+02
2-Methylphenol	95-48-7			7.8	<i>TBD</i>
Molybdenum	7439-98-7			7.8	<i>TBD</i>
Naphthalene (V)	91-20-3	1.98E-02	4.89	7.8	5.77E+03
Nickel	7440-02-0			7.8	<i>TBD</i>
Nitrate (MCL as N)	1-005			7.8	<i>TBD</i>
Nitrite (MCL as N)	1-005			7.8	<i>TBD</i>
Nitrobenzene (V)	98-95-3	8.45E-04	1.86	7.8	6.63E+00
n-Nitrosodiphenylamine (V)	86-30-6	2.86E-02	3.15	7.8	4.49E+01
n-Nitrosodipropylamine	621-64-7	1.70E-03	1.36	7.8	1.44E-02
Pentachlorophenol	87-86-5	1.13E-04	121.64	7.8	9.58E+01
Phenol	108-95-2	1.86E-05	1.40	7.8	2.67E+04
Pyrene	129-00-0	3.39E-04	154.99	7.8	1.34E+05
Selenium	7782-49-2			7.8	<i>TBD</i>
Silver	7440-22-4			7.8	<i>TBD</i>
Strontium	7440-24-6			7.8	<i>TBD</i>
Styrene (V)	100-42-5	1.37E-01	4.35	7.8	7.13E+03
Sulfate	14808-79-8			7.8	<i>TBD</i>
1,1,2,2-Tetrachloroethane (V)	79-34-5	1.53E-02	2.10	7.8	1.58E-01
Tetrachloroethene (V)	127-18-4	7.09E-01	2.70	7.8	1.15E+01
Thallium	7440-28-0			7.8	<i>TBD</i>
Tin	7440-31-5			7.8	<i>TBD</i>
Toluene (V)	108-88-3	2.52E-01	2.42	7.8	2.04E+03
Toxaphene	8001-35-2	1.38E-04	3.76	7.8	1.05E+01
1,2,4-Trichlorobenzene (V)	120-82-1	1.07E-01	6.87	7.8	1.21E+03
1,1,1-Trichloroethane (V)	71-55-6	7.63E-01	2.17	7.8	3.78E+02
1,1,2-Trichloroethane (V)	79-00-5	4.10E-02	1.90	7.8	5.13E-01
Trichloroethene (V)	79-01-6	4.35E-01	2.16	7.8	9.27E+00
2,4,5-Trichlorophenol	95-95-4	8.94E-03	3.34	7.8	1.00E+04
2,4,6-Trichlorophenol	88-06-2	1.60E-04	7.72	7.8	4.77E+01
Vanadium	7440-62-2			7.8	<i>TBD</i>
Vinyl acetate	108-05-4	2.26E-02	1.04	7.8	3.45E+04
Vinyl chloride (V)	75-01-4	3.45E+00	1.24	7.8	3.03E+00
Xylene (total)(V)	1330-20-7	2.48E-01	3.08	7.8	2.56E+04
Zinc	7440-66-6			7.8	<i>TBD</i>

Values for analytes without an MCL are calculated using the corresponding residential ground water ingestion Preliminary Programmatic Remediation Goal (PPRG) and are shown in bold italics. Analytes without an MCL or a PPRG value are not listed.

Action levels which have a calculated value greater than 1.00E+06 (1,000,000 mg/kg) are shown as ">1E+06".

(V) = Volatile chemical

TBD = Values to be determined by a joint working group

Table 4 - Tier I Subsurface Soil Action Levels

Analyte	CAS No.	Henry's Constant	Kd	Dilution Factor	Calculated Leachability at Tier I Ground Water Action Levels (pCi/g)
RADIOLOGIC PARAMETERS:					
Americium-241	14596-10-2				<i>TBD</i>
Cesium-137+D	10045-97-3				<i>TBD</i>
Plutonium-239	10-12-8				<i>TBD</i>
Plutonium-240	10-12-8				<i>TBD</i>
Radium-226+D	13982-63-3				<i>TBD</i>
Radium-228+D	15262-20-1				<i>TBD</i>
Strontium-89	11-10-9				<i>TBD</i>
Strontium-90+D	11-10-9				<i>TBD</i>
Tritium	10028-17-8				<i>TBD</i>
Uranium-233+D	11-08-5				<i>TBD</i>
Uranium-234	11-08-5				<i>TBD</i>
Uranium-235+D	15117-96-1				<i>TBD</i>
Uranium-238+D	7440-61-1				<i>TBD</i>

D = Daughters

TBD = Values to be determined by a joint working group

Values for analytes without an MCL are calculated using the corresponding residential ground water ingestion Preliminary Programmatic Remediation Goal (PPRG) and are shown in bold italics.

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Table 5 - Surface Soil Action Levels

Analyte	CAS Number	Tier I (a)			Tier II (b)	
		Office Worker Soil (mg/kg)	Open Space Soil/Sediment (mg/kg)		Office Worker Soil (mg/kg)	Open Space Soil/Sediment (mg/kg)
Acenaphthene (V)	83-32-9	1.23E+05	4.61E+05		1.23E+05	4.61E+05
Acetone (V)	67-64-1	2.04E+05	7.68E+05		2.04E+05	7.68E+05
Aldrin	309-00-2	3.36E+01	1.03E+02		3.36E-01	1.03E+00
Aluminum	7429-90-5	>1E+6	>1E+6		>1E+6	>1E+6
Anthracene (V)	120-12-7	6.13E+05	2.30E+06		6.13E+05	2.30E+06
Antimony	7440-36-0	8.18E+02	3.07E+03		8.18E+02	3.07E+03
Aroclor-1016	12674-11-2	1.43E+04	5.38E+04		1.43E+02	5.38E+02
Aroclor-1221	11104-28-2	7.43E+01	2.32E+02		7.43E-01	2.32E+00
Aroclor-1232	11141-16-5	7.43E+01	2.32E+02		7.43E-01	2.32E+00
Aroclor-1242	53469-21-9	7.43E+01	2.32E+02		7.43E-01	2.32E+00
Aroclor-1248	12672-29-6	7.43E+01	2.32E+02		7.43E-01	2.32E+00
Aroclor-1254	11097-69-1	7.43E+01	2.32E+02		7.43E-01	2.32E+00
Aroclor-1260	11096-82-5	7.43E+01	2.32E+02		7.43E-01	2.32E+00
Arsenic	7440-38-2	3.27E+02	1.00E+03		3.27E+00	1.00E+01
Barium	7440-39-3	1.41E+05	5.35E+05		1.41E+05	5.35E+05
Benzene (V)	71-43-2	1.97E+04	6.17E+04		1.97E+02	6.17E+02
alpha-BHC	319-84-6	9.08E+01	2.78E+02		9.08E-01	2.78E+00
beta-BHC	319-85-7	3.18E+02	9.75E+02		3.18E+00	9.75E+00
gamma-BHC (Lindane)	58-89-9	4.40E+02	1.38E+03		4.40E+00	1.38E+01
Benzo(a)anthracene	56-55-3	7.84E+02	2.45E+03		7.84E+00	2.45E+01
Benzo(a)pyrene	50-32-8	7.84E+01	2.45E+02		7.84E-01	2.45E+00
Benzo(b)fluoranthene	205-99-2	7.84E+02	2.45E+03		7.84E+00	2.45E+01
Benzo(k)fluoranthene	207-08-9	7.84E+03	2.45E+04		7.84E+01	2.45E+02
Benzoic Acid	65-85-0	>1E+6	>1E+6		>1E+6	>1E+6
Benzyl Alcohol	100-51-6	6.13E+05	>1E+6		6.13E+05	>1E+6
Beryllium	7440-41-7	1.33E+02	4.08E+02		1.33E+00	4.08E+00
bis(2-Chloroethyl)ether (V)	111-44-4	5.20E+02	1.63E+03		5.20E+00	1.63E+01
bis(2-Chloroisopropyl)ether (V)	108-60-1	8.17E+03	2.56E+04		8.17E+01	2.56E+02
bis(2-Ethylhexyl)phthalate	117-81-7	4.09E+04	1.28E+05		4.09E+02	1.28E+03
Bromodichloromethane (V)	75-27-4	9.23E+01	2.89E+02		9.23E+01	2.89E+02
Bromoform (V)	75-25-2	7.24E+02	2.27E+03		7.24E+02	2.27E+03
Bromomethane (V)	74-83-9	2.86E+03	1.08E+04		2.86E+03	1.08E+04
2-Butanone (V)	78-93-3	>1E+6	>1E+6		>1E+6	>1E+6
Butylbenzylphthalate	85-68-7	4.09E+05	>1E+6		4.09E+05	>1E+6
Cadmium	7440-43-9	1.02E+03	3.84E+03		1.02E+03	3.84E+03
Carbon disulfide (V)	75-15-0	2.04E+05	7.68E+05		2.04E+05	7.68E+05
Carbon tetrachloride (V)	56-23-5	4.40E+03	1.38E+04		4.40E+01	1.38E+02
alpha-Chlordane	5103-71-9	4.40E+02	1.35E+03		4.40E+00	1.35E+01
beta-Chlordane	5103-74-2	4.40E+02	1.35E+03		4.40E+00	1.35E+01
gamma-Chlordane	5103-74-2	4.40E+02	1.35E+03		4.40E+00	1.35E+01
4-Chloroaniline	106-47-8	8.18E+03	3.07E+04		8.18E+03	3.07E+04
Chlorobenzene (V)	108-90-7	4.09E+04	1.54E+05		4.09E+04	1.54E+05
Chloroform (V)	67-66-3	9.38E+04	2.93E+05		9.38E+02	2.93E+03
Chloromethane (V)	74-87-3	4.40E+04	1.38E+05		4.40E+02	1.38E+03
2-Chloronaphthalene (V)	91-58-7	1.64E+05	6.14E+05		1.64E+05	6.14E+05
2-Chlorophenol (V)	95-57-8	1.02E+04	3.84E+04		1.02E+04	3.84E+04
Chromium III	7440-47-3	>1E+6	>1E+6		>1E+6	>1E+6
Chromium VI	7440-47-3	4.86E+05	>1E+6		4.86E+03	3.67E+04
Chrysene	218-01-9	7.84E+04	2.45E+05		7.84E+02	2.45E+03

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Table 5 - Surface Soil Action Levels

Analyte	CAS Number	Tier I (a)			Tier II (b)	
		Office Worker Soil (mg/kg)	Open Space Soil/Sediment (mg/kg)		Office Worker Soil (mg/kg)	Open Space Soil/Sediment (mg/kg)
Cobalt	7440-48-4	1.23E+05	4.61E+05		1.23E+05	4.61E+05
Copper	7440-50-8	8.18E+04	3.07E+05		8.18E+04	3.07E+05
Cyanide	57-12-5	4.09E+04	1.54E+05		4.09E+04	1.54E+05
4,4-DDD	72-54-8	2.38E+03	7.46E+03		2.38E+01	7.46E+01
4,4-DDE	72-55-9	1.68E+03	5.26E+03		1.68E+01	5.26E+01
4,4-DDT	50-29-3	1.68E+03	5.16E+03		1.68E+01	5.16E+01
Dibenz(a,h)anthracene	53-70-3	7.84E+01	2.45E+02		7.84E-01	2.45E+00
Dibromochloromethane	124-48-1	6.81E+03	2.13E+04		6.81E+01	2.13E+02
Di-n-butylphthalate	84-74-0	2.04E+05	7.68E+05		2.04E+05	7.68E+05
1,2-Dichlorobenzene (V)	95-50-1	1.84E+05	6.91E+05		1.84E+05	6.91E+05
1,4-Dichlorobenzene (V)	106-46-7	2.38E+04	7.46E+04		2.38E+02	7.46E+02
3,3-Dichlorobenzidine	91-94-1	1.27E+03	3.98E+03		1.27E+01	3.98E+01
1,1-Dichloroethane (V)	107-06-2	2.04E+05	7.68E+05		2.04E+05	7.68E+05
1,2-Dichloroethane (V)	107-06-2	6.29E+03	1.97E+04		6.29E+01	1.97E+02
1,1-Dichloroethene (V)	540-59-0	9.53E+02	2.98E+03		9.53E+00	2.98E+01
1,2-Dichloroethene (total) (V)	540-59-0	1.84E+04	6.91E+04		1.84E+04	6.91E+04
2,4-Dichlorophenol	120-83-2	6.13E+03	2.30E+04		6.13E+03	2.30E+04
1,2-Dichloropropane (V)	78-87-5	8.41E+03	2.63E+04		8.41E+01	2.63E+02
cis-1,3-Dichloropropene (V)	1006-01-5	3.18E+03	9.94E+03		3.18E+01	9.94E+01
trans-1,3-Dichloropropene (V)	10061-02-6	3.18E+03	9.94E+03		3.18E+01	9.94E+01
Dieldrin	60-57-1	3.57E+01	1.10E+02		3.57E-01	1.10E+00
Diethylphthalate	84-66-2	>1E+6	>1E+6		>1E+6	>1E+6
2,4-Dimethylphenol (V)	105-67-9	4.09E+04	1.54E+05		4.09E+04	1.54E+05
Dimethylphthalate	131-11-3	>1E+6	>1E+6		>1E+6	>1E+6
2,4-Dinitrophenol	51-28-5	4.09E+05	>1E+6		4.09E+03	1.54E+04
2,4-Dinitrotoluene	121-14-2	4.09E+05	>1E+6		4.09E+03	1.54E+04
2,6-Dinitrotoluene	606-20-2	8.41E+02	2.63E+03		8.41E+00	2.63E+01
Di-n-octylphthalate	117-84-0	>1E+6	1.28E+05		4.09E+04	1.28E+03
Endosulfan I	959-98-8	>1E+6	>1E+6		1.23E+04	4.61E+04
Endosulfan II	33213-65-9	>1E+6	>1E+6		1.23E+04	4.61E+04
Endosulfan sulfate	1031-07-8	>1E+6	>1E+6		1.23E+04	4.61E+04
Endosulfan (technical)	115-29-7	>1E+6	>1E+6		1.23E+04	4.61E+04
Endrin (technical)	72-26-8	6.13E+02	2.30E+03		6.13E+02	2.30E+03
Ethylbenzene (V)	100-41-4	2.04E+05	7.68E+05		2.04E+05	7.68E+05
Fluoranthene	206-44-0	8.18E+04	3.07E+05		8.18E+04	3.07E+05
Fluorene (V)	86-73-7	8.18E+04	3.07E+05		8.18E+04	3.07E+05
Heptachlor	76-44-8	1.27E+02	3.90E+02		1.27E+00	3.90E+00
Heptachlor epoxide	1024-57-3	6.29E+01	1.93E+02		6.29E-01	1.93E+00
Hexachlorobenzene	118-74-1	3.57E+02	1.10E+03		3.57E+00	1.10E+01
Hexachlorobutadiene	87-68-3	7.33E+03	2.25E+04		7.33E+01	2.25E+02
Hexachlorocyclopentadiene	77-47-4	1.42E+04	5.36E+04		1.42E+04	5.36E+04
Hexachloroethane	67-72-1	4.09E+04	1.25E+05		4.09E+02	1.25E+03
Indeno(1,2,3-cd)pyrene	193-39-5	7.84E+02	2.45E+03		7.84E+00	2.45E+01
Isophorone	78-59-1	6.02E+05	>1E+6		6.02E+03	1.88E+04
Lithium	7439-93-2	4.09E+04	1.54E+05		4.09E+04	1.54E+05
Manganese	7439-96-5	1.01E+04	3.83E+04		1.01E+04	3.83E+04
Mercury	7439-97-6	6.13E+02	2.31E+03		6.13E+02	2.31E+03
Methoxychlor	72-43-5	1.02E+04	3.84E+04		1.02E+04	3.84E+04
Methylene chloride (V)	75-09-2	7.63E+04	2.39E+05		7.63E+02	2.39E+03

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Table 5 - Surface Soil Action Levels

Analyte	CAS Number	Tier I (a)			Tier II (b)	
		Office Worker Soil (mg/kg)	Open Space Soil/Sediment (mg/kg)		Office Worker Soil (mg/kg)	Open Space Soil/Sediment (mg/kg)
4-Methyl-2-pentanone (V)	108-10-1	1.64E+05	6.14E+05		1.64E+05	6.14E+05
2-Methylphenol	95-48-7	1.02E+05	3.84E+05		1.02E+05	3.84E+05
Molybdenum	7439-98-7	1.02E+04	3.84E+04		1.02E+04	3.84E+04
Naphthalene (V)	91-20-3	8.18E+04	3.07E+05		8.18E+04	3.07E+05
Nickel	7440-02-0	4.09E+04	1.54E+05		4.09E+04	1.54E+05
Nitrobenzene (V)	98-95-3	1.02E+03	3.84E+03		1.02E+03	3.84E+03
n-Nitrosodiphenylamine (V)	86-30-6	1.17E+05	3.65E+05		1.17E+03	3.65E+03
n-Nitrosodipropylamine	621-64-7	8.17E+01	2.56E+02		8.17E-01	2.56E+00
Pentachlorophenol	87-86-5	4.77E+03	1.49E+04		4.77E+01	1.49E+02
Phenol	108-95-2	>1E+6	>1E+6		>1E+6	>1E+6
Pyrene	129-00-0	6.13E+04	2.30E+05		6.13E+04	2.30E+05
Selenium	7782-49-2	1.02E+04	3.84E+04		1.02E+04	3.84E+04
Silver	7440-22-4	1.02E+04	3.84E+04		1.02E+04	3.84E+04
Strontium	7440-24-6	>1E+6	>1E+6		>1E+6	>1E+6
Styrene (V)	100-42-5	4.09E+05	>1E+6		4.09E+05	>1E+6
1,1,2,2-Tetrachloroethane (V)	79-34-5	2.86E+03	8.95E+03		2.86E+01	8.95E+01
Tetrachloroethene (V)	127-18-4	1.10E+04	3.44E+04		1.10E+02	3.44E+02
Tin	7440-31-5	>1E+6	>1E+6		>1E+6	>1E+6
Toluene (V)	108-88-3	4.09E+05	>1E+6		4.09E+05	>1E+6
Toxaphene	8001-35-2	5.20E+02	1.59E+03		5.20E+00	1.59E+01
1,2,4-Trichlorobenzene (V)	120-82-1	2.04E+04	7.68E+04		2.04E+04	7.68E+04
1,1,2-Trichloroethane (V)	79-00-5	1.00E+04	3.14E+04		1.00E+02	3.14E+02
Trichloroethene (V)	79-01-6	5.20E+04	1.63E+05		5.20E+02	1.63E+03
2,4,5-Trichlorophenol	95-95-4	2.04E+05	7.68E+05		2.04E+05	7.68E+05
2,4,6-Trichlorophenol	88-06-2	5.20E+04	1.59E+05		5.20E+02	1.59E+03
Vanadium	7440-62-2	1.43E+04	5.38E+04		1.43E+04	5.38E+04
Vinyl acetate	108-05-4	>1E+6	>1E+6		>1E+6	>1E+6
Vinyl chloride (V)	75-01-4	3.01E+02	9.42E+02		3.01E+02	9.42E+02
Xylene (total) (V)	1330-20-7	>1E+6	>1E+6		>1E+6	>1E+6
Zinc	7440-66-6	6.13E+05	>1E+6		6.13E+05	>1E+6
Nitrate	1-005	>1E+6	>1E+6		>1E+6	>1E+6
Nitrite	1-005	2.04E+05	7.68E+05		2.04E+05	7.68E+05
Fluoride	16984-48-8	1.23E+05	4.61E+05		1.23E+05	4.61E+05

Values are based on PPRG calculations for the specified exposure scenario. All toxicity values used in calculations are from IRIS, from HEAST, or are approved by the EAOC. Analytes without PPRGs are not listed.

(a) Tier I values represent either 1.00E-04 carcinogenic risk or a hazard index (HI) of 1 for non-carcinogenic toxicity.

(b) Tier II values represent either 1.00E-06 carcinogenic risk or a hazard index (HI) of 1 for non-carcinogenic toxicity.

(V) = Volatile chemical

Action levels which have a calculated value greater than 1.00E+06 (1,000,000 mg/kg) are shown as ">1E+06".

Table 5 - Surface Soil Action Levels

Analyte	CAS Number	Tier I				Tier II (1E-6 risk)	
		Office Worker - Soil		Open Space - Soil/Sediment		Office Worker	Open Space
		1E-4 Risk (pCi/g)	15 mrem Dose (pCi/g)	1E-4 Risk (pCi/g)	15 mrem Dose (pCi/g)	Soil (pCi/g)	Soil/Sediment (pCi/g)
RADIOLOGIC PARAMETERS:							
Americium-241	14596-10-2	7.67E+02	TBD	2.36E+03	TBD	7.67E+00	2.36E+01
Cesium-137+D	10045-97-3	7.97E+00	TBD	7.97E+00	TBD	7.97E-02	7.97E-02
Plutonium-239	10-12-8	1.01E+03	TBD	6.98E+03	TBD	1.01E+01	6.98E+01
Plutonium-240	10-12-8	1.01E+03	TBD	6.98E+03	TBD	1.01E+01	6.98E+01
Radium-226+D	13982-63-3	2.47E+00	TBD	2.47E+00	TBD	2.47E-02	2.47E-02
Radium-228+D	15262-20-1	5.06E+00	TBD	5.08E+00	TBD	5.06E-02	5.08E-02
Strontium-89	11-10-9	1.55E+04	TBD	2.71E+04	TBD	1.55E+02	2.71E+02
Strontium-90+D	11-10-9	5.72E+03	TBD	3.98E+04	TBD	5.72E+01	3.98E+02
Tritium	10028-17-8	4.48E+06	TBD	3.11E+07	TBD	4.48E+04	3.11E+05
Uranium-233+D	11-08-5	1.82E+04	TBD	9.97E+04	TBD	1.82E+02	9.97E+02
Uranium-234	11-08-5	7.08E+03	TBD	4.67E+04	TBD	7.08E+01	4.67E+02
Uranium-235+D	15117-96-1	6.23E+01	TBD	6.28E+01	TBD	6.23E-01	6.28E-01
Uranium-238+D	7440-61-1	2.99E+02	TBD	3.15E+02	TBD	2.99E+00	3.15E+00

D = daughters

TBD = To be determined by Working Group

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"Final Rocky Flats Cleanup Agreement"

ATTACHMENT 6

**NO ACTION/NO FURTHER ACTION/NO FURTHER REMEDIAL ACTION
(NFA)
DECISION CRITERIA FOR
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE**

**NO ACTION/NO FURTHER ACTION/NO FURTHER REMEDIAL ACTION (NFA)
DECISION CRITERIA FOR
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE**

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“Final Rocky Flats Cleanup Agreement”

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LIST OF ACRONYMS AND INITIALISMS

AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirement
BRA	Baseline Risk Assessment
CAD/ROD	Corrective Action Decision/Record of Decision
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CHWA	Colorado Hazardous Waste Act
CHWR	Colorado Hazardous Waste Regulation
COC	Chemical of Concern
DOE	Department of Energy
ECOC	Ecological Chemical of Concern
EPA	Environmental Protection Agency
ERA	Ecological Risk Assessment
ERAM	Ecological Risk Assessment Methodology
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
HRR	Historical Release Report
IAG	Interagency Agreement
IHSS	Individual Hazardous Substance Site
IM/IRA	Interim Measure/ Interim Remedial Action
NCP	National Contingency Plan
NFA	No Action/No Further Action/No Further Remedial Action
OU	Operable Unit
PCOC	Potential Chemical of Concern
RAGS	Risk Assessment Guidance for Superfund
RBCs	Risk-Based Concentrations
RCRA	Resource Conservation and Recovery Act
RFETS	Rocky Flats Environmental Technology Site
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RME	Reasonable Maximum Exposure
SA	Source Area
SWMU	Solid Waste Management Unit
TM	Technical Memorandum
UTL	Upper Tolerance Limit

EXECUTIVE SUMMARY

Presented in this document are No Action/No Further Action/No Further Remedial Action (NFA) decision criteria and NFA decision documentation requirements to be used as guidance for determining which geographic areas as defined by the NFA Working Group (e.g., Individual Hazardous Substance Sites [IHSSs], Source Areas [SAs], Operable Units [OUs], Areas of Concern [AOC]) at the Rocky Flats Environmental Technology Site (RFETS), Golden, Colorado may become candidates for an NFA decision.

The NFA decision process presented within this document meets the substantive requirements to support a No Action or No Further Action (as defined by CERCLA) remedy selection for a Corrective Action Decision/Record of Decision (CAD/ROD). In addition, administrative requirements for coordination of NFA decisions with the CAD/ROD process and with RCRA closures at RFETS are discussed in this document. Various processes are consolidated in this document to provide decision criteria for establishing those geographic areas at RFETS that do not require further study or remediation as part of the CERCLA process, including planned land use decisions. The steps, in order of performance, can be summarized as follows:

1. Conduct source evaluation (with available data/information). If a review of historical release information/defensible data reveals that no current or potential threat can be found, the exposure pathway is incomplete and the IHSS can be recommended for No Action.
2. Conduct a background comparison. If a review of historical release information/defensible data indicates that a current or potential threat may be present, an IHSS, usually as part of an OU, will undergo a background comparison. A background comparison is performed to distinguish between constituents that are associated with site activities and those associated with background conditions. If medium-specific environmental data collected from an IHSS are shown to be at or below background levels for inorganic chemicals, and no organic chemicals are detected in that medium, that IHSS may become a candidate for No Action.
3. Conduct a CDPHE conservative screen. The purpose of conducting a CDPHE conservative screen is to reduce the number of IHSSs that are required to undergo a CERCLA baseline risk assessment. Certain geographical areas have already been screened using the CDPHE conservative screen to evaluate human health risks. Ecological risks are screened using Tier 2 of the Ecological Risk Assessment (ERA)

process. If an IHSS or source area passes both the human health and ecological risk-based screens, then that IHSS becomes a candidate for No Action.

4. Perform a Baseline Risk Assessment (BRA). The BRA consists of a human health risk assessment (conducted on an exposure area) and an ecological risk assessment (conducted by drainage area). A BRA includes an evaluation of baseline conditions as if no action, including implementing institutional controls, were taken. Risks assuming residential exposures can be compared to risks associated with other exposure scenarios to estimate the risk consequences of alternate land uses. If the results of the BRA estimate that the risks to human health and the environment are within acceptable levels, the IHSS becomes a candidate for No Further Action or No Further Remedial Action with institutional controls, depending on the specific receptors considered by the BRA.

The remedy selection process must be documented to support a NFA decision. For those sites not evaluated as part of an RFI/RI, a document justifying the NFA decision must be prepared to present an evaluation of existing information and data to support a scientifically and legally defensible NFA decision. For those sites evaluated within an RFI/RI Report or a Letter Report (i.e., a report generated as part of the CDPHE conservative screen), additional documentation justifying the NFA decision is not necessary; the RFI/RI Report or Letter Report serves as the documentation. Rationale for an NFA decision will be summarized in an update to the Historical Release Report (HRR), and appropriate supportive documentation will be appended, as necessary. The HRR update for an NFA is intended to be a place keeper for documentation that the substantive requirements for an NFA decision have been met.

Geographic areas that can only achieve No Further Remedial Action status if an institutional control is in place will be recognized as such. An institutional control and a recommendation for No Further Remedial Action will likely be part of the final CAD/ROD for the geographic area. If the circumstances, e.g., land use or risk evaluation, change between a recommendation for an NFA and the CAD/ROD incorporating the geographic area, the documentation supporting the NFA recommendation, and the NFA recommendation itself, will be reevaluated.

If cumulative risks for an OU or the entire site are between 10^{-4} and 10^{-6} , risk management decisions must be made and may include NFA, remedial action, or risk controls such as land use designations and restrictions. DOE, in consultation with the NFA Working Group, may decide to place further remedial studies and/or closure activities on hold for a geographic area

where DOE believes there is a high likelihood that no remedial action will be required. Such geographic areas may not be recommended for No Further Remedial Action until the cumulative risks are evaluated as part of the final CAD/ROD for the geographic area.

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“Final Rocky Flats Cleanup Agreement”

1.0 INTRODUCTION

1.1 Objectives

The purpose of this document is to present decision criteria for determining those geographic areas (e.g., Individual Hazardous Substance Sites [IHSSs], Source Areas [SAs], Operable Units [OUs], Areas of Concern [AOCs]) at the Rocky Flats Environmental Technology Site (RFETS), Golden, Colorado which may become a candidate for a No Action/No Further Action/No Further Remedial Action (NFA) decision. Various processes that meet the substantive requirements in support of NFA remedy selection are consolidated in this document to provide decision criteria for establishing those geographic areas at RFETS that do not require further remediation as part of the CERCLA process, considering planned future land uses.

Presented in this document are NFA decision criteria and requirements for NFA decision documentation that ultimately can be used in the preparation of a CAD/ROD or in a RCRA closure. Administrative requirements for coordination of NFA closures at RFETS are discussed briefly in the Section 3.0 on NFA decision documentation. The primary benefits for having a preapproved NFA decision process include the following:

- Accelerate IHSS decision making and closures by not having to redevelop the NFA process for each closure.
- Track the status of successful closures at RFETS on an IHSS-by-IHSS basis.
- Eliminate negative cost and schedule impacts. Once an area has been accepted for an NFA decision, any work that is scheduled to occur within that area (e.g., routine monitoring or maintenance) should not require all the paperwork (e.g., Soil Disturbance Permit, waste determinations) or the personal protective equipment that would be needed in a contaminated (real or suspected) area. This would save time and money, and reduce the amount of waste generated.
- Limit the number and length of documents to be produced, thus reducing review time and cost of document production.
- Accelerate cleanup at RFETS by allowing resources to be directed to high priority sites.

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An NFA Strategy Working Group, comprised of members from each agency and the Kaiser-Hill Team, will be established. The primary goals for this NFA working group will be to define the geographic areas (i.e., IHSS, SA, AOC, or OU) that will be considered for the NFA determination process. If a geographic area is located where an institutional control is expected to ensure a future land use, the working group will identify the area as such and the future land use will be considered in the NFA recommendation. Geographic areas that can only achieve No Further Remedial Action status if an institutional control is in place will be recognized as such. An institutional control and a recommendation for No Further Remedial Action will likely be part of the final CAD/ROD for the geographic area. If the circumstances, e.g., land use or risk evaluation, change between a recommendation for an NFA and the CAD/ROD incorporating the geographic area, the documentation supporting the NFA recommendation, and the NFA recommendation itself, will be reevaluated.

If cumulative risks for an OU or the entire site are between 10^{-4} and 10^{-6} , risk management decisions must be made and may include NFA, remedial action, or risk controls such as land use designations and restrictions. DOE, in consultation with the NFA Working Group, may decide to place further remedial studies and/or closure activities on hold for a geographic area where DOE believes there is a high likelihood that no remedial action will be required. Such geographic areas may not be recommended for No Further Remedial Action until the cumulative risks are evaluated as part of the final CAD/ROD for the geographic area.

1.2 Regulatory Basis for NFA Decisions

On January 22, 1991, the DOE, the CDPHE, and the EPA entered into a tri-party agreement (Interagency Agreement [IAG]), as directed by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the corrective action section of the Resource Conservation and Recovery Act (RCRA), for the management of Rocky Flats Facility cleanup. This agreement was made to ensure that: (1) environmental impacts associated with past and present activities at the Rocky Flats Site would continue to be thoroughly investigated; (2) appropriate response actions would be taken; and (3) response actions would be completed as necessary to protect human health, welfare, and the environment. This framework identified the necessity of joint environmental regulatory processes to fulfill the requirements of RCRA and CERCLA. The IAG identified the required methodology for remedial actions, permit modifications, closures, and corrective actions for cleanup at Rocky Flats.

This NFA decision criteria document expands on the site-specific methodology for making NFA decisions at RFETS, using the regulatory guidance provided by CERCLA and RCRA.

1.2.1 CERCLA Guidance

Section 117 of CERCLA, as amended by SARA of 1986, requires the issuance of decision documents for remedial actions taken pursuant to sections 104, 106, 120, and 122. In response to these regulations, the EPA developed *Guidance on Preparing Superfund Decision Documents, Preliminary Draft* (EPA, 1992) and a Quick Reference Fact Sheet titled *Guide to Developing Superfund No Action, Interim Action, and Contingency Remedy RODs* (EPA, 1991a). EPA has also produced a *Record of Decision Checklist for No Action* (EPA, undated) to aid in the development of NFA decision documents and in the process of obtaining an NFA decision. EPA OSWER Directive 9355.0-30 (EPA, 1991b) was written to clarify the role of the baseline risk assessment in developing Superfund remedial alternatives and supporting risk management decisions. These documents are the basis upon which this current NFA decision criteria document for RFETS is built.

Using the NFA Quick Reference Fact Sheet (EPA, 1991a) as a basis, an NFA decision may be warranted at RFETS under three general sets of circumstances:

1. When the Site or area of the site (e.g., an OU or an IHSS) poses no current or potential threat to human health or the environment (a no action decision); or
2. When a previous response eliminated the need for further remedial response (a no further action decision); or
3. When risk calculations based on specific exposure scenarios indicate that institutional controls alone will constitute acceptable risk management (a no further remedial action decision).

EPA (EPA, 1992) defines no action as "no treatment, engineering controls, or institutional controls." Remedial alternatives that include solely institutional controls are not considered "no action." An alternative may include monitoring and still be considered "no action."

OSWER Directive 9355.0-30 (EPA, 1991b) states that: "If the baseline risk assessment and the comparison of exposure concentrations to chemical-specific standards indicates that there is no unacceptable risk to human health or the environment and that no remedial action is warranted, then the CERCLA Section 121 cleanup standards for selection of a Superfund remedy, including the requirements to meet applicable or relevant and appropriate requirements (ARARs), are not triggered."

An ARARs analysis will not be triggered for risk less than 10^{-6} for the appropriate receptor, but CERCLA does not preclude independent application of State standards by CDPHE.

1.2.2 RCRA Guidance

A RCRA corrective action is used to clean up hazardous waste or hazardous waste constituents released from any solid waste management unit (SWMU) at a permitted facility, as codified in 42 USC 6924 section 3004(u).

The State of Colorado was authorized, by the EPA, to manage hazardous waste requirements within its boundaries through the Colorado Hazardous Waste Act (CHWA). CDPHE, through its Hazardous Material and Waste Management Division, promulgated regulation in 6 CCR 1007-3 for the proper handling of hazardous waste and constituents. The Corrective Action Program for any SWMU is defined in section 264.101 of those regulations.

On November 16, 1993, CDPHE provided additional guidance for closure requirements, corrective action requirements, and other program requirements. This guidance identified the risk assessment methodology and the use thereof in making corrective action decisions for hazardous waste generator facilities that are regulated by the CHWA and its implementing regulations (Colorado Hazardous Waste Regulations [CHWR]). The methodology identifies a three-step screen approach for evaluating corrective action at a SWMU.

The first screen is a comparison to background and/or detection limits. Exceeding the detection limits or background levels (both defined in this guidance) would require screening steps two and three of the CDPHE screening process. SWMU or release sites that meet the levels prescribed in the criteria identified are considered "clean" and corrective action would not be necessary.

In addition, the July 27, 1990, Federal Register proposes 40 CFR §264.514, which presents a mechanism by which a permittee may request a permit modification to effectively terminate further requirements at a RCRA facility where no further action is justified.

For IHSSs that have interim status under RCRA, substantive requirements should be included as part of an Interim Measure/Interim Remedial Action (IM/IRA) for public comment. However, for NFAs, an IM/IRA should not be required and a Proposed Plan will suffice. In this situation, modification of the CHWA Permit for Rocky Flats will proceed as a separate

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process after the CAD/ROD is adopted. For interim status units (e.g., IHSSs), RCRA Clean Closure Certification by an independent engineer is a requirement for NFA.

1.3 Exposure Pathway—Generic Site Conceptual Model

The key criterion in proposing an NFA decision is the determination of whether any actual or potential risk to human health or the environment exists. In order for a public health or environmental threat to exist, a complete pathway for exposure must exist between a site and a receptor. Individual components of an exposure pathway from the generic site conceptual model for the *No Further Action Justification Document for Rocky Flats Plant Low-Priority Sites (Operable Unit 16)* (DOE, 1993) are shown in Figure 1.

An exposure pathway is defined as "a unique mechanism by which a population may be exposed to chemicals at or originating from the site" (EPA, 1989a). As shown in Figure 1, a credible exposure pathway must include a contaminant source, a release mechanism, a transport medium, an exposure route, and a receptor. These individual components of an exposure pathway are defined as follows:

- Contaminant Source: A contaminant source includes contaminants and/or contaminated environmental media associated with historical operations/occurrences at each IHSS
- Release Mechanisms: Release mechanisms are physical and chemical processes by which contaminants are released from the source. A conceptual model identifies primary release mechanisms, which release contaminants directly from the IHSSs, and secondary release mechanisms, which release contaminants from environmental media.
- Retention or Transport Medium: A retention or transport medium is one into which contaminants are released from the source and from which contaminants may be released to a receptor (or to another medium by a secondary release mechanism). Primary transport media include air, soil, surface water, ground water, and biota.
- Exposure Route: An exposure route is an avenue through which contaminants are physiologically incorporated by a receptor and include inhalation, ingestion, dermal contact, and external irradiation.
- Receptor: A receptor is a population affected by contamination released from a site. Potential human receptors for contaminants in IHSSs at RFETS include workers and

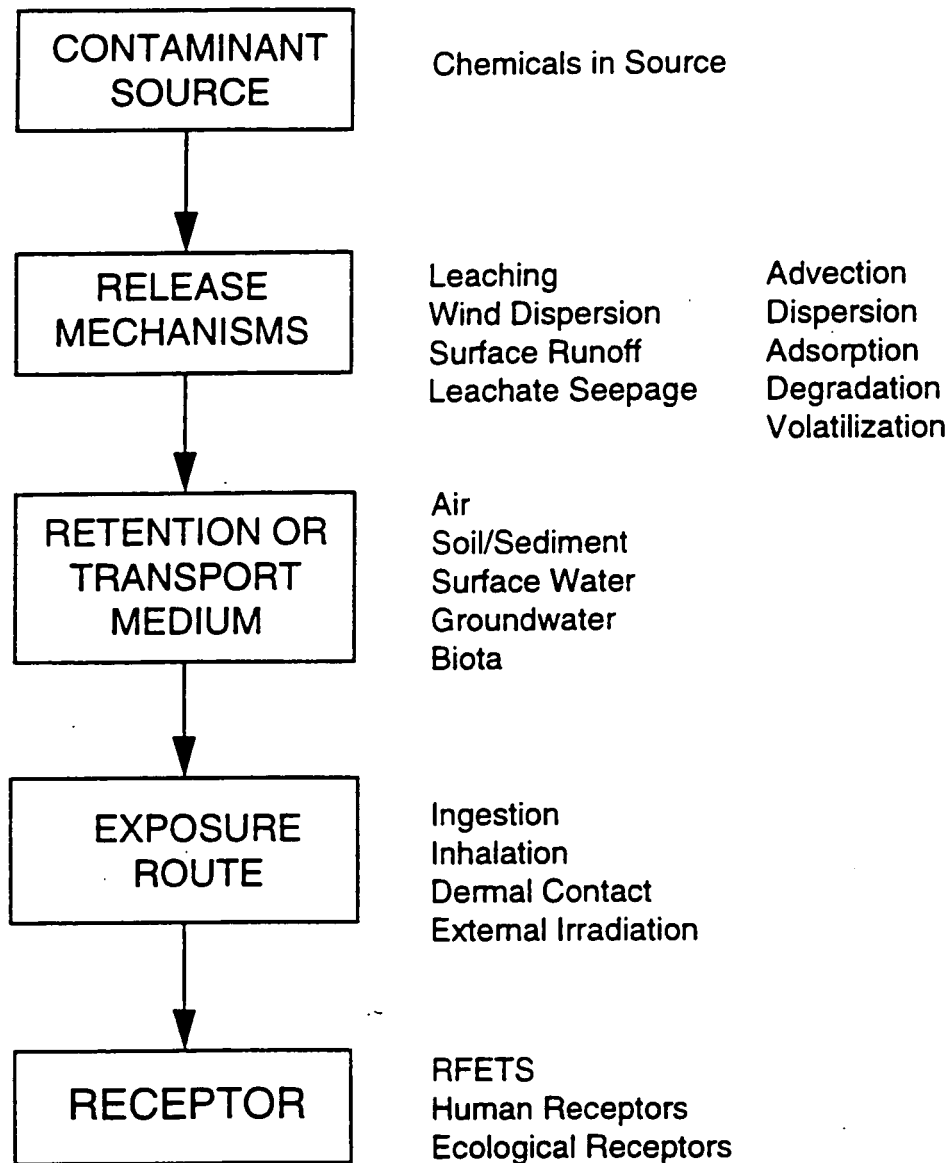


Figure 1. Exposure Pathway--Generic Site Conceptual Model

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visitors. Environmental receptors include flora and fauna. Offsite receptors could include residents or agricultural workers.

If an exposure pathway lacks any of these components, it is not complete, there is no risk, and No Action is warranted. However, if an exposure pathway is complete, an NFA can be considered if the potential risk present is within acceptable limits as determined by the CDPHE conservative screen or the BRA. If a geographic area is located where an institutional control is expected to ensure a future land use, the working group will identify the area as such and the future land use will be considered in the NFA recommendation. Geographic areas that can only achieve No Further Remedial Action status if an institutional control is in place will be recognized as such. An institutional control and a recommendation for No Further Remedial Action will likely be part of the final CAD/ROD for the geographic area. If circumstances, e.g., land use or risk evaluation, change between a recommendation for an NFA and the CAD/ROD incorporating the geographic area, the documentation supporting the NFA recommendation, and the NFA recommendation itself, will be reevaluated.

If cumulative risks for an OU or the entire site are between 10^{-4} and 10^{-6} , risk management decisions must be made and may include NFA, remedial action, or risk controls such as land use designations and restrictions. DOE, in consultation with the NFA Working Group, may decide to place further remedial studies and/or closure activities on hold for a geographic area where DOE believes there is a high likelihood that no remedial action will be required. Such geographic areas may not be recommended for No Further Remedial Action until the cumulative risks are evaluated as part of the final CAD/ROD for the geographic area.

The criteria for NFA decisions presented in Section 2.0 address both incomplete and complete exposure pathways. Section 3.0 describes the documentation requirements for making an NFA recommendation.

2.0 CRITERIA FOR NFA DECISIONS

The regulatory process for dispositioning a site suspected of contamination can be long and complex. However, there are several points in this process at which a geographic area (an IHSS, SA, AOC, or OU) can be recommended for NFA. Criteria have been developed for each decision point to determine whether or not sufficient information is available to protect human health and the environment. Figure 2 shows these NFA decision points. The remainder of this section, which is organized according to Figure 2, describes the criteria to be met at each decision point.

2.1 Source Evaluation

The first step in evaluating a geographic area is to determine what sources of contamination, if any, remain in the geographic area. If no existing source can be found, the exposure pathway is incomplete and the geographic area can be recommended for No Action. The remaining components of an exposure pathway (release mechanisms, retention or transport medium, exposure route, and receptor) are all evaluated during the risk assessment process.

The NFA criteria for demonstrating that no current or potential threat exists are site specific. Historical information must be reviewed to determine whether or not an NFA decision may be appropriate at an early stage of a site investigation. NFA justification can be accomplished using minimal investigation and characterization resources if adequate historical release information and defensible data are available; additional environmental sampling may not always be necessary. If it appears that an existing contaminant source is lacking in an IHSS, an NFA determination may be made without the need to collect additional environmental samples (Decision Point 1).

As seen in Figure 2, No Action recommendation at Decision Point 1 may be made under at least three circumstances, where a lack of contaminant source is indicated. These circumstances have already resulted in successful NFA determinations for IHSSs at RFETS. The final *No Further Action Justification Document for OUI6* (DOE, 1993) describes these circumstances, which are demonstrated in the following examples:

1. In IHSS 185, a 1986 4-gal solvent spill was cleaned up immediately, using a commercial absorbent. This solvent was not detected in subsequent ground water sampling. Based on this evidence and additional physicochemical rationale, no action was warranted for this IHSS.

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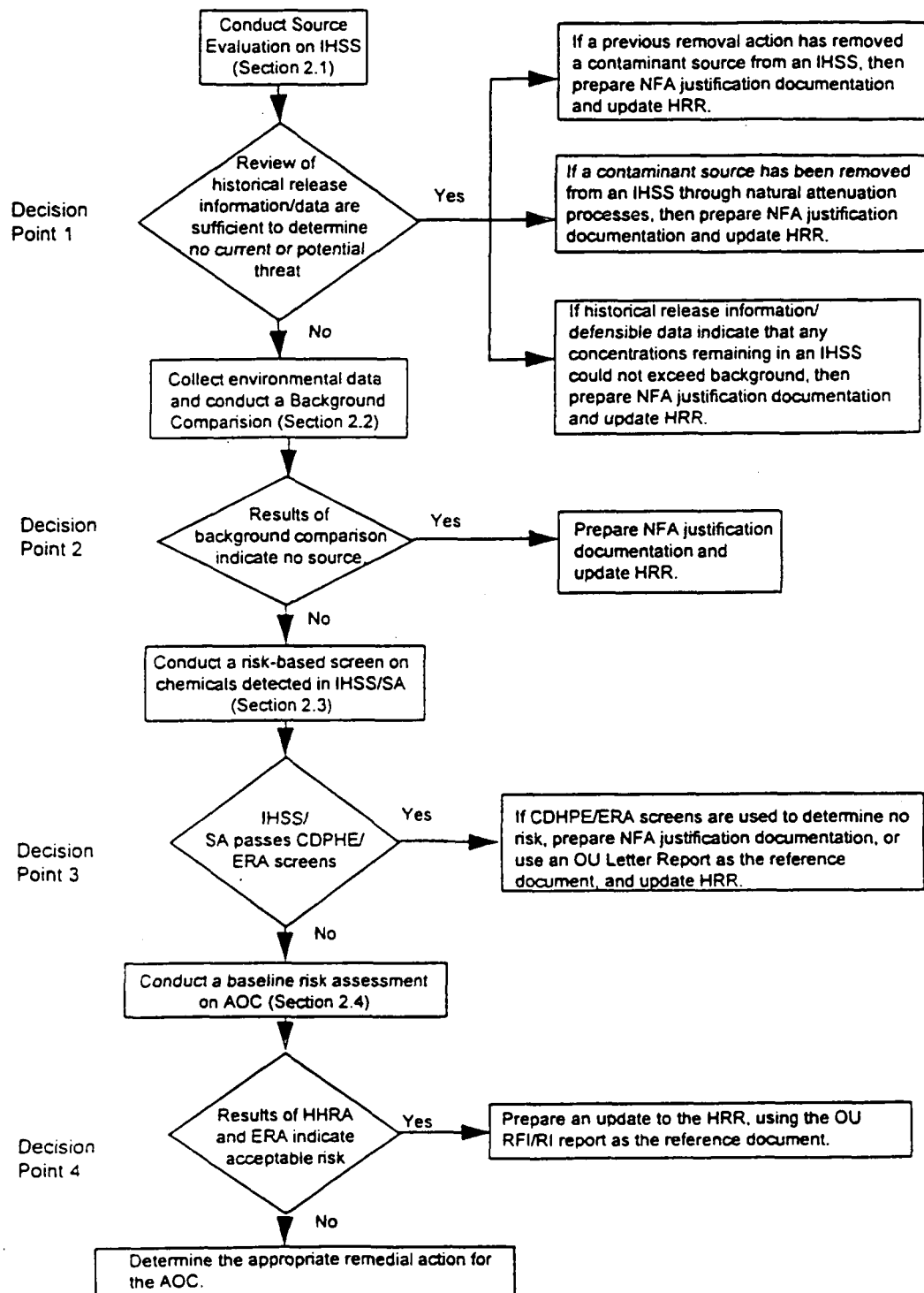


Figure 2. Decision Points for NFA Recommendations

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2. In early 1980, 155 gallons of antifreeze, containing 25 percent ethylene glycol, were released from Building 708 through a buried culvert (IHSS 192) into Walnut Creek. A fate and transport degradation model run using the physicochemical characteristics of ethylene glycol indicated that it was completely degraded through natural attenuation, resulting in an NFA decision for this IHSS.
3. A 1979 break in a steam condensate line discharged steam condensate water containing low levels of tritium onto a paved area (IHSS 194). Tritium levels in steam condensate water samples were within background activity levels; considering the half life of tritium and the time since the discharge, no action was warranted.

As with the IHSSs in OU16, this type of NFA determination may be useful for evaluating geographic areas in the Industrial Area at RFETS. However, if adequate historical release information and current environmental data are not available to make an NFA determination, the geographic area would progress to the next step in the process, which could include scoping the site investigation to obtain additional data.

2.2 Background Comparisons

If a review of historical release information/data indicates that a contaminant source may be present, the geographic area will undergo a background comparison. A background comparison is performed to distinguish between constituents that are associated with site activities and those associated with background conditions. If sufficient data are available, a statistical methodology is used to conduct the background comparison (i.e., potential chemicals of concern [PCOC] identification) for nonanthropogenic compounds. A five-phase methodology (Figure 3), used to determine if an inorganic constituent exceeds background levels, was developed and approved by DOE, EPA Region VIII, and CDPHE. This methodology is detailed in the *Human Health Risk Assessment Methodology for RFETS* (DOE, 1995a) and EG&G Interoffice Correspondence (EG&G, 1995). In addition, examples of the application of background comparison at RFETS can be found in the site-specific letter reports for OU5 (DOE, 1994a) and OU6 (DOE, 1994b).

In a statistical background comparison, PCOCs are determined on an OU-wide basis for each environmental medium. Organic chemicals are assumed to be man-made and are not compared to background. Professional judgement, using spatial, temporal, or pattern-recognition concepts, must be applied to ensure the background data set is appropriate for comparison to the OU data set (for example, geologic conditions should be considered). If

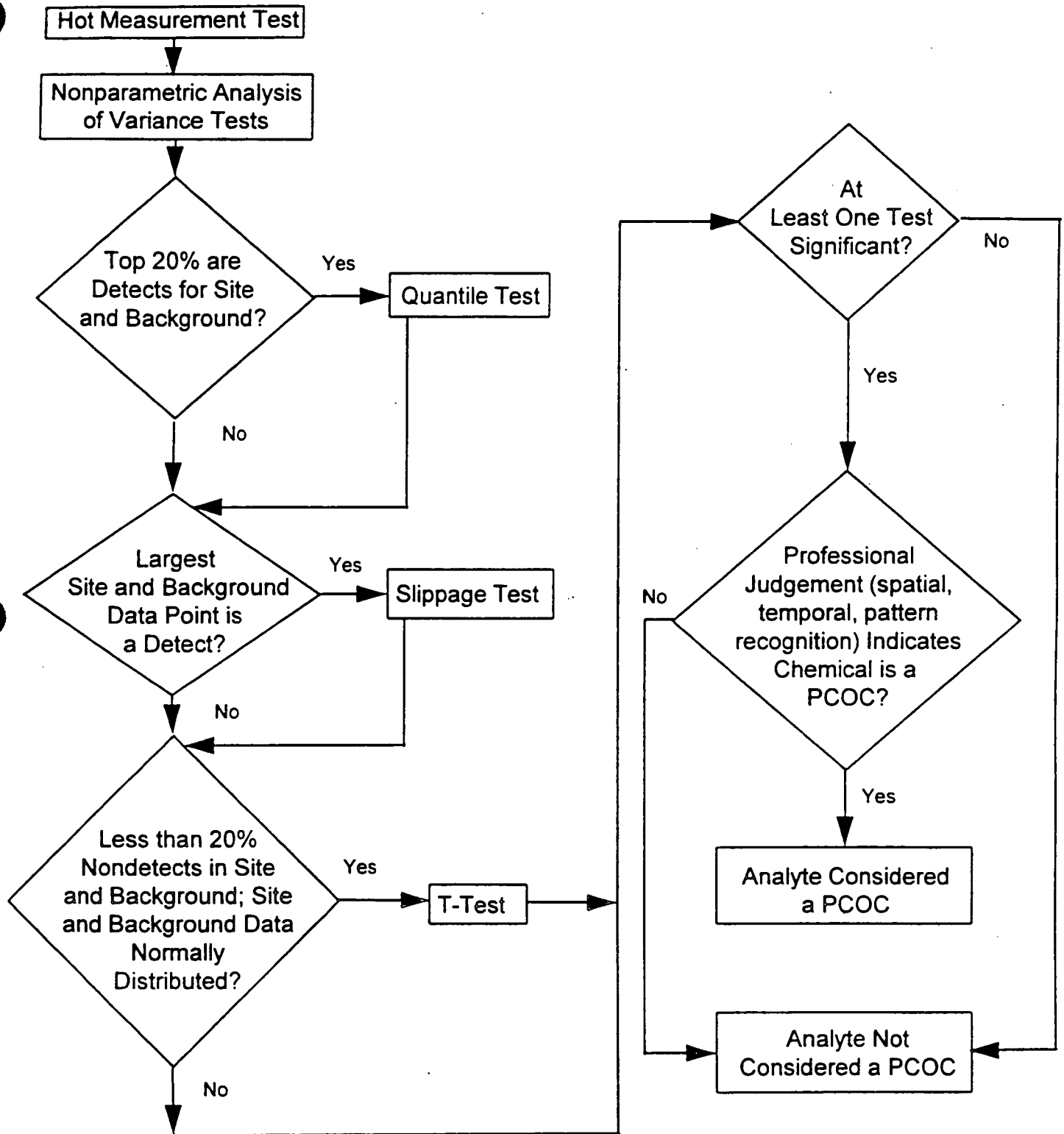


Figure 3. Background Comparison/PCOC Selection

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appropriate background data sets are not available (such as with OU3 lake sediments), a weight-of-evidence approach may be used to provide background benchmark values. Professional judgment must also be used to identify IHSSs or OUs where analyte- or medium-specific data are insufficient to run statistical background comparisons (e.g., in data sets with limited sample size or greater than 80% nondetects). In these cases, it may be more appropriate to use only the Hot Measurement Test (i.e., the maximum detected concentration of an analyte is compared to the background 99% upper tolerance limit [UTL_{99/99}] for that analyte) as a background comparison.

If medium-specific environmental data collected from an IHSS are shown to be at or below background levels for inorganic chemicals, and no organic chemicals are detected in that medium (Decision Point 2), that IHSS may become a candidate for No Action. If PCOCs are identified for an IHSS, the data must be analyzed using the CDPHE conservative screen described in Section 2.3.

2.3 Risk-based Screening of Chemicals

An IHSS having PCOCs (inorganic and/or organic), as indicated through a background comparison described in Section 2.2, must undergo a risk-based screening of chemicals before it can be recommended for no action. The purpose of conducting a risk-based screen is to reduce the number of IHSSs that are required to undergo a CERCLA baseline risk assessment. Human health risks are evaluated using the CDPHE conservative screen (Section 2.3.1); ecological risks are screened using Tier 2 of the ecological risk assessment (ERA) process (Section 2.3.2).

2.3.1 CDPHE Conservative Screen

The CDPHE conservative screen was developed by the State of Colorado to ensure that the requirements of RCRA are met. The CDPHE conservative screen was incorporated by DOE, EPA, and CDPHE into the data aggregation process used in human health risk assessment (HHRA) for RFETS. This screen is one method used by DOE, EPA, and CDPHE to make decisions regarding no action, voluntary corrective action, or further analysis through an HHRA. A CDPHE conservative screen is conducted in accordance with the guidance provided in the *Human Health Risk Assessment Methodology for RFETS* (DOE, 1995a) and shown in Figure 4.

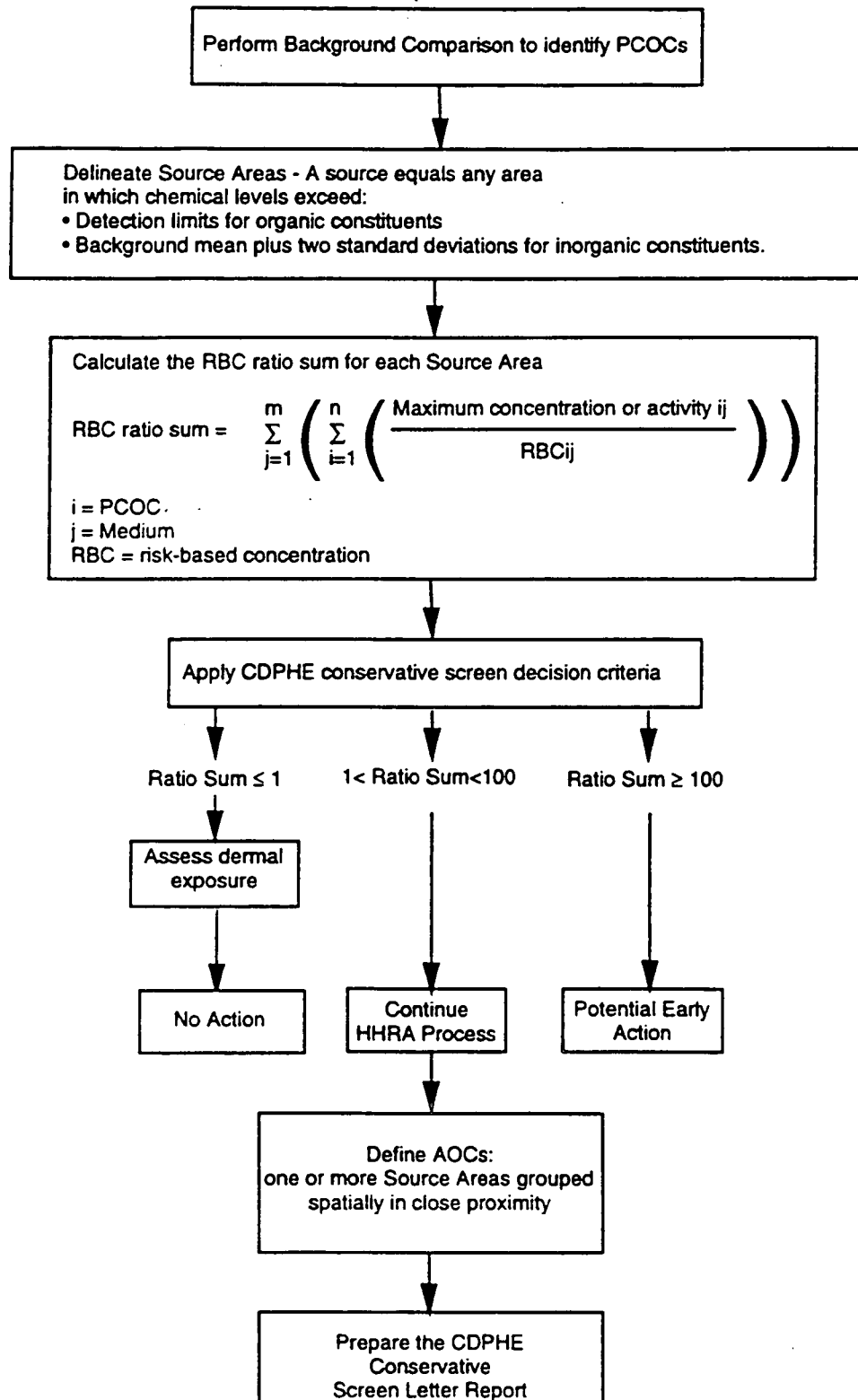


Figure 4. CDPHE Conservative Screen

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In the CDPHE conservative screen, source areas (SAs) are delineated that contain organic PCOCs above reporting limits and/or inorganic PCOCs at concentrations above the arithmetic mean plus two standard deviations of the background data. An SA consists of one or more IHSSs that are grouped together based on historical use, site characterization, PCOC types and concentrations, affected media, and rates of migration.

The CDPHE conservative screen is considered conservative based on the following requirements of the process:

- The risk-based concentrations (RBCs) ratio sum for each SA is calculated using the maximum detected concentration for an analyte, rather than the 95% upper confidence limit used in CERCLA risk assessments.
- The chemical- and medium-specific RBC is calculated assuming direct residential exposure, rather than an exposure scenario more appropriate to the site. Land use recommendations made by the Rocky Flats Future Site Working Group (1995) primarily include open space use for the buffer zone and environmental technology (industrial/office) use for the industrial area; future onsite residential land use was not recommended.
- The RBC is calculated using a carcinogenic risk of 10^{-6} and a noncarcinogenic hazard quotient of 1.0, rather than using the 10^{-4} to 10^{-6} risk range used in CERCLA risk assessments.
- The residential scenario is based on exposure assumptions and standard default factors provided for the reasonably maximum exposed (RME) residential receptor; CERCLA risk assessments also provide risk estimates for central tendency (average) receptors.
- The CDPHE conservative screen includes data for soil samples collected to a depth of 12 feet in the surface soil calculations, rather than soil from the 0- to 2-foot interval, which is more typical of CERCLA HHRAs.

The chemical-specific ratios are summed for each medium, with carcinogenic ratios summed separately from those analytes causing noncarcinogenic effects. The ratio sums for each medium are then added to get a total sum ratio for an SA. The ratios are compared to the CDPHE conservative screen decision criteria used to designate source areas as candidates for

no action, for further evaluation in the HHRA, or for possible early action (Decision Point 3). Source areas with ratio sums less than 1 may become candidates for No Action pending an evaluation of the risk associated with potential dermal contact. For source areas with ratio sums between 1 and 100, and greater than 100, DOE may evaluate the source area further in the HHRA and/or pursue a voluntary early action alternative in accordance with the Environmental Priorities List, respectively. A CDPHE conservative screen letter report is prepared to summarize the results of this screen and is used as a reference document to justify an NFA decision.

Those IHSSs or SAs within an OU that do not pass the CDPHE conservative screen are grouped into areas of concern (AOCs) for further evaluation in an HHRA. AOCs are defined as one or more SAs grouped spatially in close proximity that have historically similar waste streams (i.e., similar PCOCs).

2.3.2 Ecological Risk Assessment Tier 2 Screen

After an IHSS or source area passes the CDPHE conservative screen, it must then pass a screening-level ERA before it can become a candidate for an NFA decision. This screening process is performed according to the EPA's eight-step guidance (draft) on conducting ERAs at Superfund sites (EPA, 1994). A site-wide ecological risk assessment methodology (ERAM) was developed that is consistent with this eight-step guidance. The screening portion of this site-specific guidance is shown in Figure 5 and described in the following documents:

- *ERAM Technical Memorandum, Site-wide Conceptual Model* (DOE, 1995b) helps identify environmental stressors and the potentially complete exposure pathways that will become the focus of the ERA (DOE, 1995b).
- *ERAM Technical Memorandum, Ecological Chemicals of Concern Screening Methodology* (DOE, 1995c) describes a tiered screening process for identifying chemicals at potentially ecotoxic concentrations.

The purpose of a screening-level ERA is to detect whether a significant ecological threat exists in a geological area. After PCOCs have been determined for a geographic area, risks are estimated by comparing maximum analyte concentrations with screening-level ecotoxicity benchmarks, with the subsequent generation of hazard quotient (HQ) values. The HQ is the result of the exposure estimate divided by the benchmark. This step, which is also part of

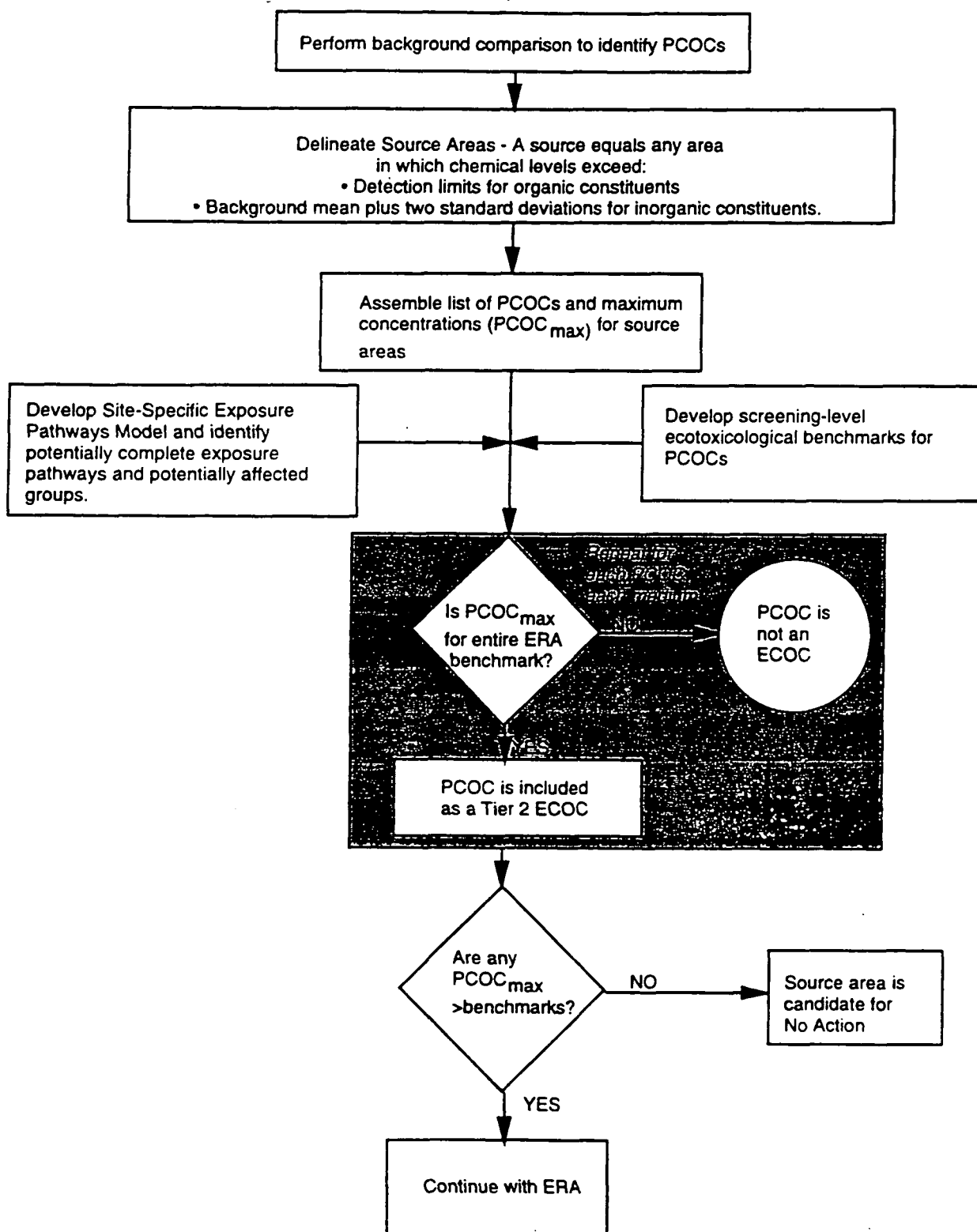


Figure 5. Screening-Level ERA

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Decision Point 3 shown in Figure 2, is used to evaluate whether the site preliminary screening is adequate to determine the presence of an ecological threat (EPA, 1994).

If none of the PCOCs are present at ecotoxic concentrations, the site is considered to present a negligible or *de minimis* risk and a more detailed quantitative risk assessment is not warranted (EPA, 1994). If the HQ for a PCOC is greater than 1, then that analyte is identified as a potential ecological chemical of concern (ECOC) and is subject to further analysis. However, if HQs for each of the PCOCs for a source area are 1 or below, the screen indicates that none of the PCOCs are present at potentially ecotoxic concentrations and should not be subjected to further analysis.

In summary, an IHSS or SA that fails to pass any of the screening criteria described in this section will be grouped with similar IHSSs or SAs into an AOC and will undergo a CERCLA baseline risk assessment (HHRA and/or ERA), as described in Section 2.4.

2.4 CERCLA Baseline Risk Assessment

CERCLA, as implemented by the NCP, establishes the overall approach for determining appropriate remedial actions at Superfund sites. The overall mandate of the Superfund program is to protect human health and the environment from current and potential threats posed by uncontrolled hazardous substance releases. To support this mandate, EPA developed the *Risk Assessment Guidance for Superfund* (RAGS) (EPA, 1989a and 1989b), which addresses both the human health and ecological risk assessments in Volumes I and II, respectively. Within remedial investigation reports, baseline risk assessments provide an evaluation of the potential threat to human health and the environment in the absence of any remedial action. The baseline risk assessment (BRA) therefore consists of an HHRA and an ERA.

The risk assessment methodology used at RFETS has been adapted to this site jointly by DOE, EPA, CDPHE, and EG&G from EPA guidance. RFETS guidance to the HHRA process is provided in the *Human Health Risk Assessment Methodology for RFETS* (EG&G, 1995). The methodology for conducting an RFETS ERA is based on the *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments* (EPA, 1994). Site-specific guidance for conducting ERAs is provided in *Ecological Risk Assessment Methodology for Rocky Flats Environmental Technology Site* (Vertucci et al., 1995).

2.4.1 Human Health Risk Assessment Methodology

As established in Section 2.3, an AOC must undergo a BRA if it does not pass through the risk-based screen. Figure 6 briefly outlines the steps taken in conducting an HHRA, which consist of the following elements:

- Identifying chemicals of concern (COCs)
- Developing exposure scenarios
- Describing fate and transport models
- Calculating intake factors
- Conducting a toxicity assessment
- Conducting a risk characterization
- Analyzing uncertainty in the HHRA
- Documenting human health risks in the BRA.

An RFI/RI report includes both a summary of risks for a site and a list of recommendations. However, the final decisions on whether or not a site will be recommended for NFA or if a remedial action is warranted is made by the risk managers from DOE, EPA, and CDPHE, with input from the stakeholders. The following are a few guidelines in making these risk-management decisions.

1. An IHSS, AOC, or OU is a candidate for an NA or NFA decision if the carcinogenic risk estimated using the exposure factors for a residential receptor is 10^{-6} or below and the noncarcinogenic hazard index (HI) is 1 or below.
2. In terms of risk-based decision making for an IHSS, AOC, or OU, a 10^{-6} excess lifetime cancer risk level is the point of departure and remedial design goal. These areas are candidates for No Further Remedial Action decision with institutional controls if the carcinogenic risk estimated using the reasonable maximum exposure factors for the appropriate receptor (e.g., open-space recreational user, office worker, construction worker) is 10^{-6} or below and the noncarcinogenic hazard index (HI) is 1 or below. An institutional control will be required to ensure the anticipated appropriate future land use.
3. Areas clearly require remedial action where the cumulative excess lifetime cancer risks exceed 10^{-4} using appropriate receptors. If cumulative risks for an OU or the entire site are between 10^{-4} and 10^{-6} , risk management decisions must be made and may

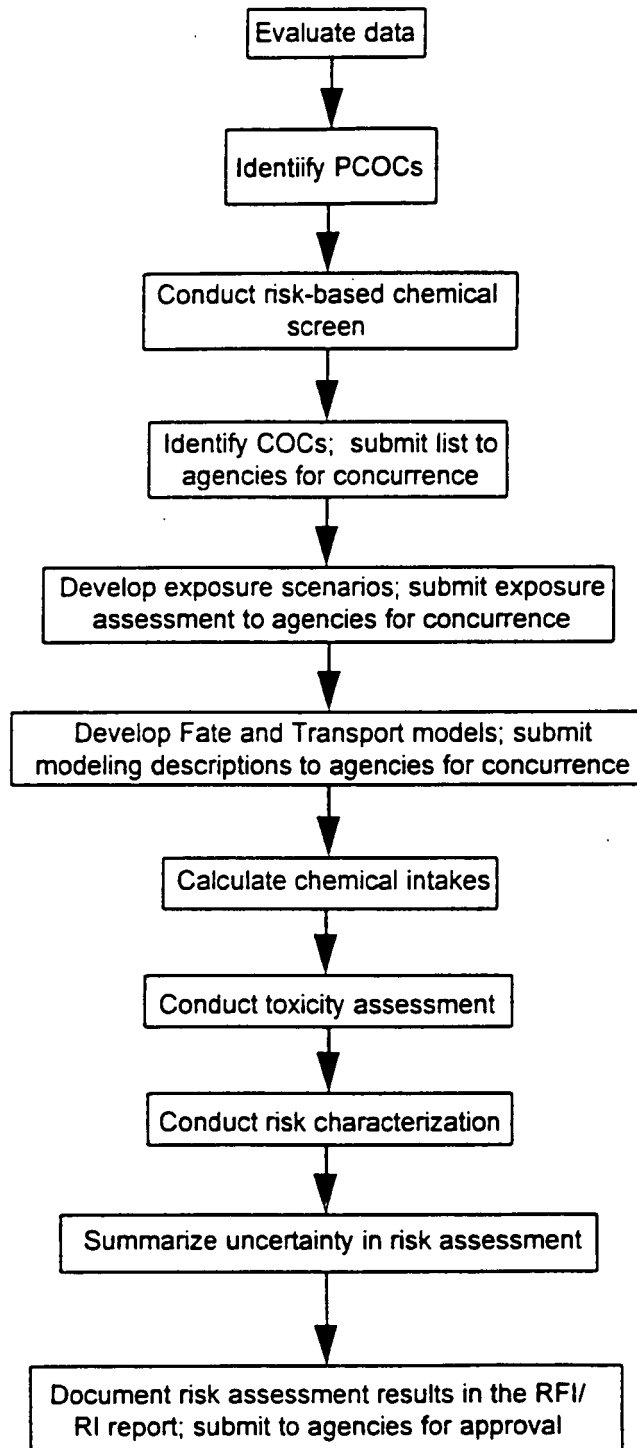


Figure 6. Human Health Risk Assessment Process

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include NFA, remedial action, or risk controls such as land use designations and restrictions. DOE, in consultation with the NFA Working Group, may decide to place further remedial studies and/or closure activities on hold for a geographic area where DOE believes there is a high likelihood that no remedial action will be required. Such geographic areas may not be recommended for No Further Remedial Action until the cumulative risks are evaluated as part of the final CAD/ROD for the geographic area. No Further Remedial Action with institutional controls may be considered when the estimated carcinogenic risks are in the low end of the risk range, when the cumulative noncarcinogenic HI is less than 10 (depending on the particular toxic effects of the chemicals involved), and when neither risk managers nor stakeholders can provide nonrisk-based justification that action is warranted.

OSWER Directive 9355.0-30 (EPA, 1991b) provides guidance to support the above criteria:

"Generally, where the baseline risk assessment indicates that a cumulative site risk to an individual using reasonable maximum exposure assumptions for either current or future land use exceeds the 10^{-4} lifetime excess cancer risk end of the risk range, action under CERCLA is generally warranted at the site. For sites where the cumulative site risk to an individual based on reasonable maximum exposure for both current and future land use is less than 10^{-4} , action generally is not warranted, but may be warranted if a chemical specific standard that defines acceptable risk is violated or unless there are noncarcinogenic effects or an adverse environmental impact that warrants action. A risk manager may also decide that a lower level of risk to human health is unacceptable and that remedial action is warranted, for example, there are uncertainties in the risk assessment results. Records of Decision for remedial actions taken at sites posing risk within the 10^{-4} to 10^{-6} risk range must explain why remedial action is warranted."

Future land use evaluations will be consistent with the Vision.

2.4.2 Ecological Risk Assessment Methodology

If data from a given IHSS or source fail to pass a Tier 2 ecological evaluation ($HQ > 1$ for any analyte), the data are evaluated using a Tier 3 ERA screen, which is basically equivalent to the concentration/toxicity screening conducted during the HHRA. A Tier 3 ERA is a much more comprehensive evaluation of exposure pathways and a more accurate method for estimating

exposure than a Tier 2 screening-level ERA. The Tier 3 exposure estimation includes methods that account for factors which modify the frequency, duration, and intensity of contact between a receptor and the contaminated media. Tier 3 evaluation results in a list of chemicals that are subjected to more detailed analysis in the ecological risk characterization.

ERA risk characterization integrates the exposure assessment and the effects assessment. It includes a description of risk in terms of the assessment endpoints, a discussion of the ecological significance of the effects, a summary of the overall confidence in the ERA, and a discussion of possible risk management strategies. Figure 7 presents the ERA process used at RFETS.

Risk characterization for each ERA study area involves quantifying exposure by using site-specific data and exposure models and comparing this exposure to dose-response information from the scientific literature. Risk characterization also involves interpretation of biological tests (e.g., toxicity tests, benthic macroinvertebrate studies) to determine any measurable ecological effects of the chemical stressors.

Risk characterization requires that different types of data be evaluated together. Balancing and interpreting the different types of data can be a major task and frequent communication between scientists from DOE, EPA, and CDPHE is essential to defensible risk characterization. Because no solid criteria exist for determining ecological risk, professional judgment will be used at this step in the NFA process. There should be agreement on the interpretation of site-specific data, the exposure assessment, the results of ecological effects studies, and the strength of the evidence linking dose-response, measured effects, and site COCs.

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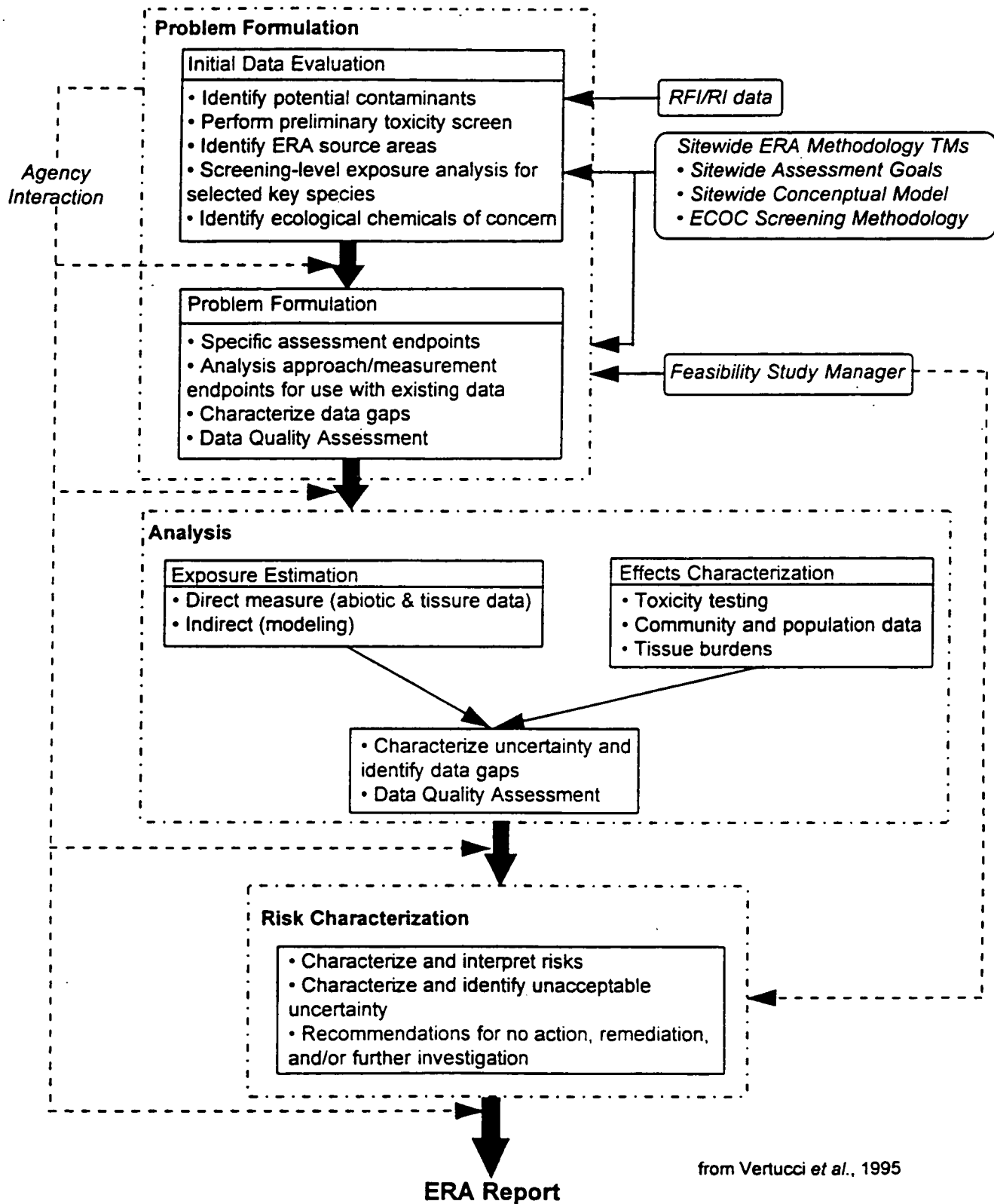


Figure 7. Ecological Risk Assessment Process at RFETS

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3.0 NFA DECISION DOCUMENTATION

The purpose of NFA decision documentation is to provide the basis for a defined geographic area's final CAD/ROD. If circumstances, e.g., land use or risk evaluation, change between a recommendation for an NFA and the CAD/ROD incorporating the geographic area, the documentation supporting the NFA recommendation, and the NFA recommendation itself, will be reevaluated. In addition, an NFA status will have a significant impact on activities at a specific job site conducted prior to a CAD/ROD. Therefore, an efficient mechanism for implementing NFA decisions will provide both long- and short-term benefits. The process was selected for communicating NFA decisions is through updates to the HRR. It is anticipated that the HRR will be maintained as part of the Rocky Flats Cleanup Agreement.

Among other purposes, these updates serve as a basis for issuing soil disturbance permits, obtaining waste determinations, and determining the appropriate level of personal protection equipment for work in an IHSS. Therefore, the HRR updates were selected for recommendations on NFA decisions, tracking IHSS status, and communicating IHSS information (e.g., information for waste determinations required by EPA and CDPHE). The HRR update format includes a description of the release event, complete physical and chemical descriptions of the constituents released, responses to the events, fate of the constituents released, and a reference section. Additionally, signature lines for DOE, EPA, and CDPHE concurrence are provided in the HRR updates. The process for updating the HRR has been developed through negotiations and document reviews from DOE, EPA, and CDPHE.

A recommendation for an NFA decision for a geographic area is presented to DOE, EPA, and CDPHE as an update to the HRR. Documentation justifying the NFA decision must accompany an NFA recommendation to support the HRR update, and ultimately, a CAD/ROD determination. Characterization of sites, including the evaluation of data to determine risk, is usually included within RFI/RI reports. For those sites evaluated within an RFI/RI Report or a Letter Report (i.e., for those IHSSs that pass the CDPHE conservative screen), additional NFA justification documentation is not necessary and the supporting documentation will be incorporated into the HRR update by reference, or appended, as necessary. For those sites not evaluated as part of an RFI/RI, NFA justification must be prepared to present an evaluation of existing information and data to support a scientifically and legally defensible NFA recommendation. This supporting documentation, which may include a CDHPE conservative screen will be included in the HRR update as an attachment or appendix.

NFA justification documentation is prepared to support NFA recommendations on IHSSs for which a (1) source evaluation has determined no current or potential threat exists, (2) background comparison has indicated no current or potential threat of a contaminant source, and (3) future screening-level risk evaluation has indicated no risk, or risk within acceptable levels, is present. Depending upon the IHSS being evaluated, supporting documentation will vary in the type, quantity, and quality of information and data. The NFA working group must determine whether or not available data are necessary and sufficient to perform a given process evaluation that must be made for each site. Appropriate guidance (e.g., EPA/CERCLA, CDPHE/CHWA) is available to help determine if necessary and sufficient data are available to perform background comparisons and/or a risk-based screening of chemicals. An evaluation of data quality should be performed prior to using data and the results of that evaluation should be included as part of the documentation to ensure that the data quality objective process (generally presented in the OU work plan or sampling and analysis plan) is used during the investigation and documented properly.

An example of the types of information to be included as backup information is presented in Table 1. This sample table of contents can be modified, as necessary, to meet site-specific needs. It is also intended that all justification documentation be as brief as possible, including only the necessary and sufficient information required to support a scientifically and legally defensible recommendation.

The NFA decisions recommended in the HRR updates are intended to be "place keepers". An IHSS can be placed on hold until the NFA working group agrees, or another appropriate body, that initiating the administrative process (Proposed Plan, Closure Plan, CAD/ROD, RCRA Permit Modification, etc.) for IHSS closure is beneficial. Geographic areas placed on hold by DOE, in consultation with the NFA Working Group, may be recommended for No Further Remedial Action after the cumulative risks are evaluated for the final CAD/ROD for a geographic area for which the estimated carcinogenic risks are in the low end of the risk range, the cumulative noncarcinogenic effects are less than 10 (depending on the particular toxic effects of the chemicals involved), and neither risk managers nor stakeholders can provide nonrisk-based justification that action is warranted.

The administrative process under CERCLA would be initiated with the preparation of a Proposed Plan, which may recommend closure of several IHSSs in one CAD/ROD. Proposed

Table 1
Generalized Information Requirements for NFA Justification Documentation

- 1.0 INTRODUCTION
 - 1.1 Purpose of Document
 - 1.2 Background Information
- 2.0 FIELD INVESTIGATION
 - 2.1 Site Investigation Objectives, including data quality objectives
 - 2.2 Site History and Available Data
 - 2.3 Investigation Activities
 - 2.4 Data Quality and Usability
- 3.0 PHYSICAL CHARACTERISTICS
 - 3.1 Surface Features
 - 3.2 Geology
 - 3.3 Hydrogeology
 - 3.4 Ecology
- 4.0 NATURE AND EXTENT OF CONTAMINATION
 - 4.1 Source Evaluation
 - 4.2 Site Conceptual Model
 - 4.3 Background Comparison
 - 4.4 Nature and Extent of Contamination
- 5.0 EVALUATION OF RISKS
 - 5.1 Risk-based Screening of Chemicals
 - 5.2 Summary of Baseline Risk Assessment
- 6.0 NFA JUSTIFICATION
- 7.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS
- 8.0 REFERENCES

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LIST OF FIGURES
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Plans can be developed for individual sites, groups of sites, OUs and unrelated sites, depending upon the timing or benefit of any given closure or closures being pursued.

For IHSSs that have interim status under RCRA, substantive requirements should be included as part of an IM/IRA for public comment. However, for NFAs, an IM/IRA should not be required and a Proposed Plan will suffice. In this situation, modification of the CHWA Permit for Rocky Flats will proceed as a separate process after the CAD/ROD is adopted. For interim status units (e.g., IHSSs), RCRA Clean Closure Certification by an independent engineer is a requirement for NFA.

It is noted that in cases where IHSSs overlap, both IHSSs must meet the NFA criteria in order for closure of their respective geographical area to be pursued via the administrative process described above. The NFA status of an overlapping IHSS may still be documented with an HRR update, but the IHSS must be identified within the HRR update as overlapping with another IHSS which has or has not been accepted as having NFA status. This process will ensure that the area of IHSS overlap is still considered when the HRR is utilized for soil disturbance permits, waste determinations, personal protective equipment, and so forth. In addition, HRR updates can continue as required by the IAG and geographical areas may ultimately be closed.

4.0 REFERENCES

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DOE, 1994a. *Letter Report on the Colorado Department of Public Health and Environment Source Area Delineation and Risk-based Conservative Screen and the Environmental Protection Agency Areas of Concern Delineation for the Human Health Risk Assessment for Woman Creek Priority Drainage Area (Operable Unit No. 5), Rocky Flats Environmental Technology Site*. Rocky Flats Environmental Technology Site, Golden, CO. (November 28)

DOE, 1994b. *Letter Report on the Colorado Department of Public Health and Environment Source Area Delineation and Risk-based Conservative Screen and the Environmental Protection Agency Areas of Concern Delineation for the Human Health Risk Assessment for Walnut Creek Priority Drainage Area (Operable Unit No. 6), Rocky Flats Environmental Technology Site*. Rocky Flats Environmental Technology Site, Golden, CO. (October)

DOE, 1995a. *Human Health Risk Assessment Methodology for RFETS (Draft)*. Prepared for DOE Rocky Flats Field Office by EG&G Rocky Flats, Inc., RF/ER-95-0088, Golden, CO.

DOE, 1995b. *Ecological Risk Assessment Methodology Technical Memorandum No. 2, Site-wide Conceptual Model (Draft Final)*. Prepared for DOE Rocky Flats Field Office by EG&G Rocky Flats, Inc., Golden, CO. (March)

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EPA, 1991a. *Guide to Developing Superfund No Action, Interim Action, and Contingency Remedy RODs*. Office of Emergency and Remedial Response, Quick Reference Fact Sheet 9355.3-02FS-3, Washington D.C. (April)

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EPA, 1992. *Guidance on Preparing Superfund Decision Documents (Preliminary Draft)*. Office of Emergency and Remedial Response, Directive 9335.3-02, Washington D.C. (January)

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EPA, Undated. *Record of Decision Checklist for No Action*.

Vertucci, F.A., Lavelle, B., Lewis, M., Love, J., and Wickstrom, M., 1995. *Ecological Risk Assessment Methodology for Rocky Flats Environmental Technology Site*. IN: *Proceedings for ER '95*, Denver, CO. (August 13-17)

ATTACHMENT 7

LIST OF REPOSITORIES

List of Repositories

Rocky Flats Reading Room
Front Range Community College Library
3645 W. 112th Avenue
Westminster, Colorado 80030
(303) 469-4435

Office of Customer Service
Colorado Department of Public Health
and Environment
4300 Cherry Creek Drive South, A1
Denver, Colorado 80222
(303) 692-2035
(800) 886-7689

Citizens Advisory Board
9035 Wadsworth Parkway, Suite 2250
Westminster, Colorado 80021
(303) 420-7855

U. S. Environmental Protection
Agency, Region VIII
Superfund Records Center
999 18th Street
Denver, Colorado 80202-2466
(303) 312-6473

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“Final Rocky Flats Cleanup Agreement”

ATTACHMENT 8

REGULATORY MILESTONES

RFCA REGULATORY MILESTONES

FY99

M1	Either a) ship cumulative amount of 78% of 10/01/96 pond/salt inventory offsite and evacuate all waste from Tent 9 by 9/30/99, or b) the additional onsite storage for pond/salt is operational by 9/30/99.
M2	Ship 670 m ³ of TRU/TRM to WIPP by 9/30/99, assuming a January 1999 opening.
M3	Ship 1,750 cubic meters of low level waste by 9/30/99.
M4	Complete installation and operate remedial action described in decision document for Solar Pond plume (N. Walnut Creek) by 9/30/99.
M5	Complete installation and operate remedial action described in decision document for East Trenches/903 Pad/Ryan 's Pit Mound plume (S. Walnut Creek) by 9/30/99.
M7	Develop a comprehensive characterization/remediation strategy for the Industrial Area soils and ground water by 9/30/99.
M8	Complete off-site shipment by 9/30/99 for treatment and/or disposal of all T-1 waste streams not returned to T-1, and for which treatment or disposal locations are available and controlling documents are in place by 4/30/99.
M9	Complete information management system for integrated site-wide monitoring and environmental database by 9/30/99.
M10	Either a) construct and operate new facility for storage of TRU/TRM by 9/30/99, or b) by 9/30/99 demonstrate adequate storage available for TRU/TRM through 9/30/00.
M11	Complete characterization of the 903 Pad as defined in the approved Sampling Analysis Plan by 9/30/99 (with the exception of the remaining radiologic boreholes, which will be completed by 12/31/99).

FY00

M1	Ship 100% of 10/1/96 pondcrete/salterete inventory off-site by 5/30/00 and evacuate all wastes from Tents 10 and 11.
M2	Complete demolition to slab of Building 779 by 9/30/00.
M3	Complete demolition to slab of Building 886 by 9/30/00.
M4	Complete remediation described in decision document for Bowman's Pond.

FY00 (cont.)

M5	Ship a minimum of 1700 cubic meters of Low Level Waste between 9/30/99 and 9/30/00.
M6	Ship 1340 cubic meters of TRU/TRM to WIPP from 10/1/99 to 9/30/00.

Outyear Milestones

M1	Initiate 903 Pad remediation by 6/1/01
M2	Complete off-site shipments of TRU/TRM by 2006..
M3	Complete D&D of Building 707 by 2005.
M4	Complete remediation of 903 Pad and off-site disposal of remediation wastes by 9/30/03.

ATTACHMENT 9

BUILDING DISPOSITION

BUILDING DISPOSITION

PURPOSE

The purpose of this attachment is to define the process for building disposition, the standards for final building disposition, and process for waste management for waste generated for building disposition.

DEFINITION

Building disposition is defined as the sequence of activities required to take a building/facility from its existing condition to final disposition. In this attachment, the term "building disposition" is used to describe the entire process, and to avoid confusion with the preexisting meanings of Deactivation and Decommissioning terms in Department of Energy and Nuclear Regulatory Commission parlance. As used in this Attachment, "building" may refer to entire buildings, to portions of buildings, or only to structures, systems, or components within buildings.

BUILDING DISPOSITION APPROACH

CHARACTERIZATION PROGRAM. A reconnaissance level characterization will be made to establish a preliminary estimate of the type of contamination or safety hazard present. All buildings and facilities at RFETS will have this preliminary characterization. The type and tractability of radiation and hazardous substances contamination, and physical hazards will be evaluated. Additional surveys to characterize contamination, as well as physical safety hazards, will be conducted throughout the disposition process.

SITE BUILDING DISPOSITION BASELINE. The characterization program provides the planning data base needed for estimating and scheduling the work required for disposition. A multi-year building disposition baseline will be developed, including estimates of resource needs. The building disposition baseline will be included in the Site-Wide Integrated Baseline.

OVERALL APPROACH. Unless building specific conditions otherwise warrant, the activities denoted below will be performed in each building:

- a) containerized waste and material removed;
- b) liquid waste and processing systems drained;
- c) RCRA units closed or have a closure plan integrated with building disposition plan;
- d) all TRU waste, defined as materials in excess of 100 nanocuries per gram, removed;

- e) equipment, piping, ducts, gloveboxes, and major electrical components removed (i.e. strip out);
- f) radioactive hot spots and hazardous substances removed; and
- g) easily removed contamination removed.

As part of the building disposition process, consideration will be given to maximizing reuse and recycling of salvageable material, when economically feasible. Different areas within a single building can be at different phases in the disposition approach, e.g., one room can be undergoing deactivation, while the rest of the building is in post-deactivation. For those buildings where SNM activities never took place, the disposition process will begin with post-deactivation.

GENERAL PROCEDURES. General procedures are being developed for the entire site that will describe actions for building disposition and will include RFCA standard operating protocols (RSOPs). The building disposition process will define decision making criteria and how RSOPs will be applied. The RSOPs will provide a detailed description of each work activity. Buildings determined at the time of the reconnaissance level characterization to have significant contamination or hazards will need building-specific disposition plans. For buildings determined at the time of the reconnaissance level characterization to be free of significant contamination or hazards, decontamination will be conducted under the general procedures codified in the Decommissioning Program Plan. When the Final Survey Report is accepted, the building will be available for reuse or dismantlement. Any building determined at the time of the reconnaissance level characterization to be free of contamination will go directly to reuse or dismantlement.

DECOMMISSIONING OPERATIONS PLANS. A Decommissioning Operations Plan will be developed for any building found as a result of its characterization to have significant contamination or hazards. The Decommissioning Operations Plan will present an activity-based program to decontaminate the locations identified in that building's preliminary characterization study as contaminated or presenting a physical hazard. Any proposals for cleanup of a building will include a risk, economic, and engineering assessment.

STANDARDS FOR BUILDING DISPOSITION

NEW REGULATIONS PROPOSED. The federal agencies (DOE, EPA and NRC) involved in radiation protection of the public and the environment have been developing new regulations for decommissioning. The three agencies recognize the need for consistency in the regulations that they are developing. A joint working group has been in existence for several years. In public discussion and in written status reports, the agencies continue to promise this consistency.

BUILDING RADIATION CLOSURE STANDARDS. It is DOE's intention to follow

EPA's preliminary regulation that calls for an effective dose equivalent (EDE) of 15/75¹ mrem from the site in any single year above background. This means: (1) Conduct remediation so that, after completion of the remedial action, radioactive material in excess of background radiation levels shall not exceed concentrations that could cause any reasonably maximally exposed member of the public to receive, through all potential exposure pathways, an EDE of 15 mrem from RFETS in any single year. The 15 mrem will be calculated using exposure scenarios that are consistent with the land uses contemplated in the Rocky Flats Vision; and (2) Determine that the remediation provides a reasonable expectation that, for 1000 years after completion of the remedial action in the event of failure of the active control measures, radioactive material in excess of background radiation levels shall not exceed concentrations that could cause any reasonably maximally exposed member of the public to receive, through all potential exposure pathways, an EDE of 75 mrem¹ from RFETS in any single year. Once this EPA Site Remediation Regulation is promulgated as final, RFFO will modify its programs if necessary to comply with the requirements of the final regulation.

For a building to be released for unrestricted use, it would need to meet the 15 mrem annual dose equivalent to the maximally exposed member of the public as estimated using appropriate analysis techniques; or have control measures providing that level of protection in place consistent with its use. The Parties have agreed to follow the procedures defined in DOE Order 5400.5 for free release of equipment. (These are the same procedures contained in the proposed 10 CFR 834 for release of equipment.) They are consistent with commercial nuclear power industry practice.

AREAS OF RADIOACTIVE CONTAMINATION. The parties agree to work together to establish measurement procedures to determine what areas of radioactive contamination will be decontaminated after strip out of a building is complete. The goal will be two fold: to reduce the residual radiation and to do so by an approach that minimizes the amount of waste generated. All building disposition practices will minimize the risk potentially associated with radiological exposure and all radiological exposures are to be balanced against economic and social factors producing a positive net benefit to the worker, general public, and the environment. The parties have agreed that all TRU waste will be isolated and removed from the buildings. TRU waste is a material having activity greater than 100 nCi/gm based on average bulk volume.

After strip out, further characterization of radioactive areas will be undertaken, where necessary. An evaluation will be made of technically applicable decontamination methods. As part of this evaluation, the type of waste expected to be generated and the cost of its treatment, storage and/or disposal will be estimated as well as the cost of required

¹ EPA has revised the 75 mrem to 85 mrem dose limit in its preliminary rule at 40 CFR 196. This attachment will be modified when the rule is final.

engineering and personal protective systems.

HAZARDOUS AND TOXIC SUBSTANCE CONTAMINATION. Measurement techniques will be selected for estimation of residual hazardous substances after strip out. The thrust will be to identify areas of fixed contamination which will need to be segregated during demolition in order to minimize waste generation volume and management cost for treatment and/or disposal. The techniques to remove identified areas of hazardous contamination will be included in building specific disposition plans. In buildings where the decision is made to forego the preparation of building specific disposition plans, hazardous contamination will be dealt with on a task order basis, with application of known well-tested technology.

WASTE MANAGEMENT

WASTE ACTIVITIES. When the disposition process is carried out in an individual building, the waste generated will be segregated by type: radioactive, mixed, hazardous, or sanitary. If the particular type of waste is planned to be disposed of off site in the near term, then the waste should be packaged to meet the waste acceptance criteria of the off site facility. The determination of whether a generated waste is TRU, will be made by assaying the container after packaging and establishing its activity on a weight basis. The waste determination for low level waste will be made based on the presence of radiation in the material before its removal. Attention will be given to waste minimization, in this case, the effort will be to remove the areas of radiation contamination, while segregating the contamination from the bulk (uncontaminated) material.

Should the decision be made to store the waste on site in an interim storage facility, the waste acceptance criteria would again be set based on the planned interim storage. If the waste is to be packaged (containerized) at the point of origin for later shipment, the procedure for waste packaging will be established to conform to that requirement.

Reuse or solid waste designations will be made for equipment that passes the free-release criteria and meets government surplus requirements. Hazardous waste determinations will be made based on applicable RCRA requirements.

ATTACHMENT 10

RCRA/CHWA CLOSURE FOR INTERIM STATUS UNITS

RCRA/CHWA Closure for Interim Status Units

I. For closure of the Solar Evaporation Ponds (IHSS 101) and the Present Landfill (IHSS 114), which are both subject to RCRA/CHWA interim status requirements, and which will be closed in-place, DOE must, at a minimum:

A. Place a cap/cover over the unit using two design criteria:

1. "design concentration limits (DCLs)" calculated to be protective of the most directly impacted surface water using the water quality standards listed in Table 1 of Attachment 5.
 - DCLs would be calculated on a unit-specific basis for ground water passing the downgradient unit boundary. Since closure remedies must last beyond the period of active remediation, DCLs would be back-calculated from the surface water quality standards listed in Table 1 of Attachment 5.
 - DCLs assume an ongoing release from the unit, but at levels that are protective of human health and the environment, consistent with the RFETS Vision.
 - DCLs, as a cap/cover design criteria for closure, will be presented within the appropriate decision documents.
2. for units with existing ground water contamination, the cap/cover must be designed to control any remaining source to the extent that further contaminant contribution to the plume from the unit is not capable of enlarging the plume or increasing contaminant concentrations within the plume. The parties recognize that existing plumes may continue to migrate or expand independent of continued source contamination loading. As a design criteria for a cap/cover, the unit/source must have its rate of continuing release controlled to the extent necessary to prevent enlarging the plume or increasing contaminant concentrations.

B. After the cap/cover has been installed, points of compliance (POCs) for each unit will be determined. The POCs will generally be at the unit boundaries, but may:

1. utilize existing monitoring wells to the greatest extent possible, and
2. utilize "waste management areas" (see CHWR, Section 264.95(b)(2)). For the Solar Ponds, the waste management area would be the area prescribed by a line circumscribing all five surface impoundments, including the area covered by the outermost berms of each. For the Present Landfill, the waste management area would be the entire area in which waste has been placed. If waste management areas are used, POCs may be chosen at the downgradient limit of the area rather than the downgradient limit of each individual unit.

RFCA
Attachment 10

- C. At the POCs, compliance would be based on:
1. non-exceedance of "alternate concentration limits (ACLs)" at units/areas with either no ground water contamination or levels of contamination less than the ACLs.
 2. generally declining contamination levels for units/areas with pre-existing ground water contamination levels greater than the ACLs (this assumes placement of a DCL cap/cover is in place).
 3. As with DCLs, ACLs would be calculated on a unit/area specific basis for ground water passing the POCs. Since closure remedies must last beyond the period of active remediation, ACLs would be back-calculated from the surface water quality standards listed in Table 1 of Attachment 5 so as to be protective of the most directly impacted surface water. To the extent that points of compliance are unit boundaries, the ACLs should equal the DCLs for those units. ACLs may be different from the DCLs when several units have been consolidated within a waste management area.
 4. The POCs and ACLs will be designated within the appropriate decision document and approved by the regulators when the decision document is approved after appropriate public review and comment.
- D. Closure requirements will not extend to remediation or management of existing ground water contamination from these units except as delineated in B.2 above. Existing ground water contamination will be addressed through coordinated RCRA corrective action/CERCLA remedial action, as described in RFCA.
- E. Other large-scale remedial actions taken at RFETS may enhance the ability to comply with closure requirements. For instance, units that can benefit from large-scale dewatering or ground water diversion projects may be able to demonstrate ACL compliance with a minimal non-standard cover/cap.
- F. All closures will be performed in consideration of the Environmental Restoration Ranking (Attachment 4).
- G. Any materials generated during implementation of a closure action that are also generated as part of a corrective action will be considered "remediation wastes" for the purpose of CAMU utilization.
- H. All post-closure requirements, including monitoring, maintenance, access control, and security requirements, will be delineated in the Closure Plan, IM/IRA, or CAD/ROD decision document for the unit or waste management area.

II. To meet the RCRA/CHWA closure requirements for all other IHSSs subject to interim status requirements (portions of the former OU 9, OU 10 and OU 13 consisting of tanks, ancillary equipment, and storage pads - See Attachment 3), DOE must, at a minimum:

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- A. Remove all wastes from the units.
- B. If the units have not had a release, close the units and associated ancillary equipment. For the tanks and storage areas that make up this universe of units at RFETS, this should be able to be accomplished via:
 - 1. decontamination of the unit and any ancillary equipment, and/or
 - 2. removal and appropriate disposition/disposal of the unit and any ancillary equipment.

Closure via 1. or 2. above should result in "clean" closure (i.e., no ongoing responsibility for post-closure care) and DOE may obtain complete closure certification.

- C. If the units have had a release, DOE should proceed through the activities outlined II.B above. However, DOE must also remove all contaminated soil affected by the unit unless a demonstration can be made that the contaminated soil cannot practicably be removed (265.197(a)). If this demonstration can be made and soil contaminated by a release from any of these units is left in place, the unit must close as a landfill (265.197(b)). In addition, backfilling a tank and its ancillary equipment with material that effectively and permanently immobilizes any remaining contaminants would be an acceptable means of closure in place. If either contaminated soil or a back-filled tank is left in place, Section I of this attachment, including post-closure requirements, would apply. If the contaminated soils and the tank can be practicably removed and the requirements of II.B.1 or II.B.2 have been accomplished, the unit can be "clean" closed with no ongoing responsibility for post-closure care and DOE may obtain complete closure certification.
- D. Closure requirements will not extend to remediation or management of existing ground water contamination from these units except as delineated in I.B.2 above. Existing ground water contamination will be addressed through coordinated RCRA corrective action/CERCLA remedial action, as described in RFCA.
- E. All closures will be performed in consideration of the Environmental Restoration Ranking (Attachment 4).
- F. After initially removing hazardous waste inventory from the units, all wastes generated during implementation of a closure action will be considered "remediation wastes" for the purpose of CAMU utilization.
- G. All post-closure requirements, including monitoring, maintenance, access control, and security requirements, will be delineated in the Closure Plan, IM/IRA, or CAD/ROD decision document for the unit or waste management area.

III. CDPHE and DOE agree that past decisions regarding IHSSs (or portions thereof) at RFETS subject to closure requirements shall be reviewed (See Attachment 3). Based upon this review, and in consideration of more complete information, it is the expectation of the CDPHE and DOE that several of these IHSSs may not be subject to interim status closure requirements.

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“Final Rocky Flats Cleanup Agreement”

ATTACHMENT 11

LIST OF ADDRESSESS

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List of Addresses

Environmental Protection Agency, Region VIII
ATTN: Rocky Flats Project Manager, EPR-FF
18th Street, Suite 500
Denver, Colorado 80202-2466

RFCA Unit Leader
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, Colorado 80222

RFCA Project Coordinator
United States Department of Energy
Rocky Flats Field Office
Box 928
Golden, Colorado 80402-0928

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"Final Rocky Flats Cleanup Agreement"

ATTACHMENT 12

RFCA DOCUMENTS INDEX

RFCA Documents Index

1. Quality Assurance Criteria Document, Rev. 1, Kaiser-Hill Company L.L.C., effective February 2, 1996 (Or most current version).
2. Historical Release Report for the Rocky Flats Plant, Volumes I and II, U.S. Department of Energy, June 1992.
3. Existing ER Standard Operating Procedures.
4. Rocky Flats Site-wide Integrated Public Involvement Plan, U.S. Department of Energy, March 1998.
5. Treatability Study Workplans listed in the Administrative Record.
6. Health and Safety Practices, EG&G Rocky Flats, Inc., (Adopted by Kaiser-Hill Company, L.L.C. in July 1995) September 30, 1995 (Or most current version).
7. Plan for Prevention of Contaminant Dispersion, U.S. Department of Energy, February 1992.
8. Background Geochemical Characterization Report Rocky Flats Plant, U.S. Department of Energy, September 30, 1993.
9. Final Treatability Studies Plan, Volumes I and II, U.S. Department of Energy, August 1991.
10. Final resolutions of previous disputes that are relevant to implementation of RFCA. The Administrative Record shall be reviewed for such resolutions, and this list will be updated accordingly.
11. Department of Energy, Rocky Flats Environmental Technology Site, Integrated Monitoring Plan FY98/FY99, October 1998.
12. Department of Energy, Decommissioning Program Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, October 8, 1998. Approved by CDPHE on November 4, 1998. Approved by EPA on November 12, 1998.
13. Department of Energy, Modification to the Decommissioning Program Plan, Rocky Flats Environmental Technology Site, December 22, 1998.

PAMs

1. Department of Energy, Proposed Action Memorandum Hotspot Removal Rocky Flats Plant Operable Unit 1, Rocky Flats Plant, Golden, Colorado, September 1994.
2. Department of Energy, Final Proposed Action Memorandum Remediation of Polychlorinated Biphenyls, Rocky Flats Environmental Technology Site, Golden, Colorado, May 1995.

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3. Department of Energy, Modified Proposed Action Memorandum Passive Seep Collection and Treatment Operable Unit 7, Rocky Flats Environmental Technology Site, Golden, Colorado, July 1995.
4. Department of Energy, Modified Proposed Action Memorandum Passive Seep Collection and Treatment Operable Unit 7, minor modification, July 1998.
5. Department of Energy, Final Proposed Action Memorandum for the Remediation of Individual Hazardous Substance Site 109, Ryan's Pit, Rocky Flats Environmental Technology Site, Golden, Colorado, August 24, 1995.
6. Department of Energy, Final Proposed Action Memorandum Remediation and Draft Modification of Colorado Hazardous Waste Corrective Action Section of the Operating Permit for Rocky Flats Environmental Technology Site, Golden, Colorado, October 1995.
7. Department of Energy, Draft Proposed Action Memorandum Remediation for the Contaminant Stabilization of Underground Storage Tanks, Rocky Flats Environmental Technology Site, Golden, Colorado, February 14, 1996.
8. Department of Energy, Proposed Action Memorandum for the Source Removal at Trenches T-3 and T-4 IHSSs 110 and 111.1, Rocky Flats Environmental Technology Site, Golden, Colorado, August 24, 1995.
9. Department of Energy, Final Proposed Action Memorandum for the Source Removal at the Mound Site, IHSS 113, Revision 0, Rocky Flats Environmental Technology Site, Golden, Colorado, February 3, 1997. Approved by EPA in February 1997.
10. Department of Energy, Final Proposed Action Memorandum for the Source Removal at Trench 1, IHSS 108, Rocky Flats Environmental Technology Site, Golden, Colorado, July 1997. Approved by EPA on August 27, 1997.
11. Department of Energy, Final Proposed Action Memorandum for the Source Removal at Trench 1, IHSS 108, modification, February 1998. EPA approved the modification in March 1998.
12. Department of Energy, Building 123, Proposed Action Memorandum, Rocky Flats Environmental Technology Site, Golden, Colorado, August 1997. Approved by CDPHE on August 25, 1997.
13. Department of Energy, Building 123 Proposed Action Memorandum, minor modification, May 21, 1998.
14. Department of Energy, Building 980 Cluster, Proposed Action Memorandum, Revision 0, Rocky Flats Environmental Technology Site, Golden, Colorado, August 1997. Approved by CDPHE on August 25, 1997.
15. Department of Energy, Final Proposed Action Memorandum for the East Trenches Plume, Rocky Flats Environmental Technology Site, Golden, Colorado, February 4, 1999. Approved by EPA in February 1999.

IM/IRAs and Decommissioning Operation Plans

1. Department of Energy, Final Interim Measures/Interim Remedial Action Decision Document for Rocky Flats Industrial Area, Rocky Flats Environmental Technology Site, Golden, Colorado, November 1994.
2. Department of Energy, Operable Unit 4 Solar Evaporation Ponds Interim Measures/Interim Remedial Action Environmental Assessment Decision Document, Rocky Flats Environmental Technology Site, Golden, Colorado, April 9, 1992.
3. Department of Energy, Interim Measures/Interim Remedial Action Plan and Decision Document, 881 Hillside Area, Operable Unit No. 1, Rocky Flats Plant, Golden, Colorado, January 1990.
4. Department of Energy, Final Surface Water Interim Measures/Interim Remedial Action Plan/Environmental Assessment and Decision Document South Walnut Creek Basin, Rocky Flats Plant, Golden, Colorado, October 1994.

NOTE: The last two IM/IRA references (January 1990 IM/IRA and the October 1994 IM/IRA) were administratively combined in 1995.

5. Department of Energy, Modification to the Final Surface Water Interim Remedial Action Plan Environmental Assessment and Decision Document South Walnut Creek Basin dated October 1994. Approved by EPA on July 11, 1997.
6. Department of Energy, Modification to the Interim Measures/Interim Remedial Action Plan and Decision Document, 881 Hillside Area Operable Unit No. 1, dated January 1990. Conditionally Approved by EPA on August 27, 1997.
7. Department of Energy, Final Mound Site Plume Decision Document, Major Modification to the Final Surface Water Interim Measures/Interim Remedial Action Plan/ Environmental Assessment and Decision Document for South Walnut Creek March 1991, Revised October 1994, Rocky Flats Environmental Technology Site, Golden, Colorado, September 30, 1997. Approved by EPA in September 1997.
8. Department of Energy, Termination of the Final Surface Water Interim Remedial Action Plan Environmental Assessment and Decision Document South Walnut Creek Basin dated October 1994, July 28, 1998.
9. Department of Energy, Interim Measure/Interim Remedial Action Decision Document, National Conversion Pilot Project, Stage II, Rocky Flats Field Office, Golden, Colorado, March 30, 1995.

NOTE: Although this IM/IRA is regulated under RFCA, the IM/IRA provides that the activities conducted under the IM/IRA shall not become regulatory milestones. Further, the National Conversion Pilot Project work is funded in accordance with a Cooperative Assistance Agreement, and not through normal RFETS budget planning. The work being done under this IM/IRA will cease upon expiration of the funds provided under the Cooperative Assistance Agreement for Stage II. The IM/IRA work is not included in the Integrated Sitewide Baseline.

10. Corrective Action Management Unit Interim Measure/Interim Remedial Action Decision Document and Application Support Document for Containerized Storage at the Rocky Flats Environmental Technology Site, Golden, Colorado, Final, August 1997. Approved by CDPHE on August 28, 1997.

11. Corrective Action Management Unit Interim Measure/Interim Remedial Action Decision Document and Application Support Document for Bulk Storage at the Rocky Flats Environmental Technology Site, Golden, Colorado, Final, August 1997. Approved by CDPHE on August 28, 1997.
12. Department of Energy, Decommissioning Operations Plan for the 779 Cluster Interim Measure/Interim Remedial Action, Rocky Flats Environmental Technology Site, Golden, Colorado, February 1998. Approved by CDPHE on February 6, 1998.
13. Department of Energy, Decommissioning Operations Plan, for the 779 Cluster Interim Measure/Interim Remedial Action, modification, June 2, 1998. *(At the time the modification was requested, CDPHE verbally agreed with the modification; written approval is being sought to complete the record.)*
14. Department of Energy, Decommissioning Operations Plan for the Building 779 Cluster, modification, October 12, 1998. The modification included the demolition plan for Building 729. The modification was approved by CDPHE on November 13, 1998.
15. Department of Energy, Decommissioning Operations Plan for the Building 779 Cluster, modification, February 16, 1999. *(This modification had not been approved by CDPHE as of February 26, 1999.)*
16. Department of Energy, Building 886 Cluster Closure Project Interim Measure/Interim Remedial Action, Rocky Flats Environmental Technology Site, Golden, Colorado, July 30, 1998. Approved by CDPHE on August 3, 1998.
17. Department of Energy, Building 771/774 Closure Project Decommissioning Operations Plan, Rocky Flats Environmental Technology Site, Golden, Colorado, December 1998. Approved by CDPHE on January 11, 1999.

CAD/RODs

1. Department of Energy, Corrective Action Decision/Record of Decision, Operable Unit 11: West Spray Field, Rocky Flats Environmental Technology Site, Golden, Colorado, September 1995. Approved October 1995.
2. Department of Energy, Corrective Action Decision/Record of Decision, Operable Unit 15: Inside Building Closures, Rocky Flats Environmental Technology Site, Golden, Colorado, September 1995. Approved October 1995.
3. Department of Energy, Corrective Action Decision/Record of Decision, Operable Unit 16: Low Priorities Sites, Rocky Flats Environmental Technology Site, Golden, Colorado, August 1994. Approved October 1994.
4. Department of Energy, Corrective Action Decision/Record of Decision, Operable Unit 1, Rocky Flats Environmental Technology Site, Golden, Colorado, March 1997. Approved March 1997.
5. Department of Energy, Corrective Action Decision/Record of Decision, Operable Unit 3, Rocky Flats Environmental Technology Site, Golden, Colorado, April 1997. Approved June 1997.

ATTACHMENT 13

UST CLOSURE LETTER AGREEMENT

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March 13, 1996

Mr. Mark Silverman
U. S. Department of Energy
Rocky Flats Office, Bldg 116
P.O. Box 928
Golden, Colorado 80402-0928

Dear Mr. Silverman,

The purpose of this letter is to describe how CDPHE and the Oil Inspection Section of the Colorado Department of Labor and Employment (OIS) will coordinate Rocky Flats Cleanup Agreement (RFCA) activities in the Industrial Area of RFETS that are regulated by the Colorado Petroleum Storage Tanks Act (Tanks Act).

OIS is the state agency responsible for implementation of the Tanks Act. However, pursuant to the Draft RFCA, Part 8, Regulatory Approach, CDPHE has been designated the Lead Regulatory Agency (LRA) for RFCA activities in the Industrial Area, including activities associated with implementation of the Tanks Act. Therefore, at RFETS, CDPHE will consult with OIS as described in this letter. To facilitate coordination among the parties, CDPHE, in its role as LRA, will assure that the substantive UST closure and remediation requirements are met.

All of the Underground Storage Tanks (USTs) on RFETS are owned by DOE, but are currently operated by a contractor or sub-contractor to DOE. Kaiser-Hill is overseeing the closure of 20 of the USTs, 18 of which have been and are currently being used to store diesel fuel and two of which have been and are currently being used to store gasoline.

Closure of the Tanks: Prior to closing 19 of the 20 USTs, an above-ground storage tank (AST) will be installed near the location of the USTs. Fuel in each UST will be transferred to the AST, each UST will be appropriately cleaned and then sealed with closed cell polyurethane foam. The remaining UST will be closed in place, but will not be replaced with an AST. OIS will be responsible for rendering permit decisions for any ASTs that require permits.

Assessment and Remediation of Any Tank Releases: Four of the 20 USTs are situated behind Building 331, the Site's garage (the Garage Tanks). Two of the Garage Tanks have been and are currently being used to store diesel fuel, and two have been and are currently being used to

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store gasoline. An assessment of the Garage Tanks has already been conducted. The first assessment was done by CH2M Hill in 1992. This investigation was undertaken when stained soils were discovered around the fill pipes during the installation of spill and overfill prevention equipment. CH2M Hill concluded that the staining was caused by several spills that occurred prior to the area having been paved with asphalt. CH2M Hill prepared and submitted to the State a report describing those activities. Weston conducted a further assessment of the area during 1994 and 1995. Weston assessed the soil, installed four groundwater monitoring wells, twice sampled the groundwater, and prepared and submitted to the State a Site Characterization Report and Corrective Action Plan and Groundwater Monitoring Reports. The analytical results for the groundwater samples all tested non-detect for BTEX and TPH. OIS has already agreed, and CDPHE endorses, that the Garage Tanks may be closed in place without any further assessment of the soil or groundwater. This agreement includes the proper abandonment of the four groundwater monitoring wells near the Garage Tanks should DOE decide to do so.

RFCA and the RFETS Vision incorporate continuing restricted land use for the site (open space and industrial use only), and development of a Site-wide groundwater strategy. Using these aspects of RFCA and the fact that diesel constituents are not very mobile, CDPHE, DOE, and OIS agree that the following site assessment will be conducted for each of the remaining 16 tanks, all of which stored diesel fuel: One geoprobe sample will be taken on each side of each tank, as close to the tank as is possible and in the backfill, if possible. The geoprobe will be driven at least to the bottom of the original trench for each tank. A soil sample will be collected at the bottom of the fill, or at an equivalent depth if outside the backfill, or one foot above the ground water, if ground water is present above the bottom of the fill material. Each soil sample will be field tested for TPH. In addition, although there is no requirement to drive the geoprobe to groundwater, groundwater will be field tested for TPH if encountered. For any tank with sample results below 5,000 ppm of TPH, the tank may be closed in place without further remedial action.

Given the need to coordinate both the installation of the ASTs as well as the closure of each UST, CDPHE, DOE, OIS, and Kaiser-Hill agree that one closure report will be submitted to CDPHE and OIS for review when all of the USTs have been assessed that includes all tanks that meet the agreed upon 5000 ppm TPH standard. CDPHE will coordinate the review of the report with OIS, as well as any comments thereto, and will approve or disapprove the report as LRA pursuant to RFCA, Part 8, Paragraph 113(j), "Closeout Reports".

For any tank with sample results above 5,000 ppm of TPH, CDPHE, DOE, OIS, and Kaiser-Hill will meet to discuss further action to be taken, if any. On the basis of these discussions, one or more of the following actions will be taken:

1. a closure report will be submitted pursuant to the previous paragraph for each tank for which no further action is required;

2. the parties will initiate the process to revise, if necessary, the Site-wide ground water strategy;
3. a Proposed Action Memorandum (PAM) will be prepared covering all tanks for which corrective action is to be taken. This PAM will include the corrective action requirements for each tank and associated contamination, but will not need to identify utilities. CDPHE will coordinate the review of the PAM with OIS, as well as any comments thereto, and will approve or disapprove the PAM as LRA pursuant to RFCA, Part 8, Paragraph 113(k), "PAMs".

If you have any questions regarding these matters, please call CDPHE at the number below.

Sincerely,

/s/
Joe Schieffelin, Unit Leader
Federal Facilities Program
CDPHE
303-692-3356

/s/
Richard O. Piper
State Inspector of Oils
CDOLE

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“Final Rocky Flats Cleanup Agreement”

APPENDIX 1

**Memorandum of Understanding
Governing Regulation and Oversight
of Department of Energy Activities in the
Rocky Flats Environmental Technology Site
Industrial Area**

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**Memorandum of Understanding
Governing Regulation and Oversight
of Department of Energy Activities in the
Rocky Flats Environmental Technology Site
Industrial Area**

Department of Energy
Environmental Protection Agency
Colorado Department of Public Health and Environment
Defense Nuclear Facilities Safety Board

February 15, 1996

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“Final Rocky Flats Cleanup Agreement”

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Memorandum of Understanding

I. BACKGROUND AND STATEMENT OF PURPOSE

The Department of Energy (DOE) manages a government-owned, contractor-operated facility at Rocky Flats in the State of Colorado that formerly played a major role in the production of nuclear weapons. Weapons production has ceased and the mission has changed primarily to decommissioning. Most remaining operations are dedicated to stabilization, treatment, safe storage, and containment of special nuclear materials (SNM) and waste at the site. Activities at the site, now named the Rocky Flats Environmental Technology Site (RFETS), range from interim storage of plutonium pits awaiting final disposition off-site, to removal and remediation activities at designated operable units under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), the Colorado Hazardous Waste Act (CHWA), and Resource Conservation and Recovery Act (RCRA).

Three independent entities currently oversee and regulate environmental, health, and safety aspects of DOE activities at RFETS. These entities are the U.S. Environmental Protection Agency (EPA), the Defense Nuclear Facilities Safety Board (DNFSB or Board), and the Colorado Department of Public Health and Environment (CDPHE). In some circumstances, these entities exercise concurrent jurisdiction over facilities or materials as the result of overlap in applicable statutory provisions. For example, cleanup of a facility contaminated with mixed radioactive waste is subject to regulation by EPA and Colorado, pursuant to CERCLA, RCRA, and CHWA (depending on the nature of the cleanup action), as well as by DOE and the Board pursuant to the Atomic Energy Act of 1954, as amended (AEA). Plutonium and other nuclear materials mixed with hazardous waste are subject to RCRA permits governing treatment, storage, and disposal of the hazardous component of "mixed" waste, and are also subject to Board safety oversight of nuclear waste storage. DOE regulates activities related to special nuclear material, subject to DNFSB oversight, under the AEA.

In this Memorandum of Understanding (MOU), the three regulatory/oversight entities agree to cooperate by fulfilling their respective legal responsibilities in an integrated manner designed to minimize impediments to progress in DOE's cleanup and decommissioning efforts. DOE is provided with a single qualified entity serving as coordinator for each activity. The objective is to prevent redundant and potentially wasteful regulation or oversight of DOE activities in the RFETS Industrial Area during remaining operations, deactivation, and decommissioning. At a joint meeting of the principals on October 10-11, 1995, in Denver, the four entities agreed to discuss protocols whereby DOE would interface with a single entity, and would be subject to a single set of consistent standards and requirements, for any given operation, decommissioning, or

Memorandum of Understanding

cleanup activity. The goal is to establish a single primary regulator ("primary entity") with authority and responsibility for each activity. The other regulatory/oversight entities are expected, to the extent permitted by law, to work through the primary entity in resolving environmental, safety, and health issues with DOE.

This draft MOU is the result of discussions among DOE and the three entities following the Denver meeting, and details the procedures and protocols governing interactions among the regulatory and oversight entities. Substantive safety, environmental, and health requirements and protocols for operations, decontamination, and decommissioning activities are being developed by another working group.

This MOU adheres to the following general principles:

1. Each of the four entities (DOE, EPA, DNFSB, and CDPHE) recognizes the legitimate interests of the other entities, and the citizens of the State of Colorado and the nation at large, in the operation, decommissioning, cleanup and environmental restoration of RFETS in a manner that adequately protects public health and safety and the environment.
2. Each of the four entities agrees that the primary entity will keep the public appropriately informed of environmental, safety, and health activities at the site and involve the public in the decision-making processes to the extent allowed by law.
3. To avoid inefficient duplication of regulation and oversight of DOE activities at RFETS, the four entities agree to:
 - a. Recognize the need for different entities to play primary, secondary, and other roles in the regulation and oversight of different activities occurring at RFETS from now until completion of environmental restoration. These roles are largely determined by the strength of statutory mandates and the expertise possessed by the various entities;
 - b. Cooperate in preparing and commenting on, or concurring with, as appropriate, a site-wide deactivation and decommissioning plan for RFETS, to be completed by the end of 1996; and
 - c. Review and comment on, or concur with, as appropriate, project plans for major facilities, for example, buildings 371, 771, 776/777, 707, and 991,

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and in standards/requirements identification documents ("S/RIDs") and other standards designed to govern the deactivation and decommissioning process with an eye toward early resolution of any environmental, safety, and health issues and toward avoiding conflicts and disputes which can delay the process.

4. Statutory responsibilities and jurisdiction of the four entities are not expanded, diminished, or altered by the terms of this MOU. The AEA, and Federal and State environmental, safety, and health statutes prescribe responsibilities that must be accommodated. For example, regardless of the designation of a primary entity, federal agencies retain emergency response powers that cannot be overridden given a substantial threat of release of a hazardous substance into the environment, or an imminent or severe threat to public health or safety. Moreover, the State must protect its citizens from any threats to their health and safety arising at RFETS. Both EPA and State authorities retain responsibilities for enforcement against violations of the law. The Board retains responsibility for issuance of safety recommendations to the President or the Secretary of Energy if "necessary to adequately protect public health and safety."

Advantages of this MOU process include:

- Streamlining EPA/CDPHE into a lead regulator for environmental regulatory activity;
- Identifying a single set of consistent requirements for all activities in the Industrial Area;
- Identifying a primary regulatory/oversight entity for each activity to serve as the point-of-contact for DOE. Secondary entities may independently monitor and inspect activities in a manner that does not adversely impact DOE or the contractor, and shall work through the primary entity to resolve any concerns identified, to the extent allowed by law;
- Identifying a dispute resolution process that will ordinarily be used before an entity exercises its enforcement or reserved statutory authority;
- Satisfying the environmental, safety, and health priorities of each entity; and

Memorandum of Understanding

- Preserving mandatory statutory responsibilities of each entity in the event disputes cannot be resolved through the process delineated in this MOU.

II. REGULATORY AND OVERSIGHT ROLES

A. Primary Regulatory / Oversight Entity

A primary regulatory/oversight entity (hereinafter referred to as primary entity) is either CDPHE, EPA, or DNFSB, and will take the lead in regulation or oversight of designated DOE activities. (See Figure 1.) Primary entities in this MOU have been selected based upon the scope and depth of the entities' legal responsibilities for the activities and materials covered, and upon the recognized expertise which each primary entity brings to the environmental, safety, and health problems associated with those activities and materials.

B. Secondary Regulatory / Oversight Entities

A secondary regulatory/oversight entity (hereinafter referred to as secondary entity) is either CDPHE, EPA, or DNFSB. Secondary entities possess special expertise or legal responsibilities for regulating or overseeing aspects of the activities or materials covered and agree to work through the primary entity in resolving environmental, safety, and health issues with DOE, to the extent allowed by law. Secondary entities support monitoring or inspection activities of the primary entity, but are not precluded from conducting independent inspection activities or acquiring information, consistent with statutory responsibilities. A secondary entity's health, safety, and environmental comments, findings, and concerns will be presented to, and resolved with, DOE through the primary entity, to the extent allowed by law.

Secondary entities will either review and concur with, or review and comment to, the primary entity on DOE's activities and the primary entity's regulatory/oversight proposal, plan, finding, compliance activity, or other action, as appropriate. (See Figure 1 text.) Concurrence is achieved if consensus is reached between the primary and secondary entities with respect to the regulatory or oversight issues. Primary entities will consider the comment of entities with review and comment authority as identified in this MOU. However, with respect to entities with review and comment authority, there is no obligation on the part of the reviewing entity to provide comments in all cases. With respect to any secondary entity, there is no obligation on the part of primary entities to reach

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consensus with the secondary entities. In the event a secondary entity cannot fulfill its statutory obligations by working through the primary entity, the secondary entity may invoke the dispute resolution clause as appropriate prior to invoking the reserved authority clauses of this MOU. Secondary entities having the right under this MOU to review and concur, but having no jurisdiction over materials or activities, will have no further role under this MOU after exhausting the dispute resolution process with the primary entity.

III. DEFINITIONS

The following definitions are not universally-accepted, but have been provided for the purpose of interpreting and using this MOU.

A. *Decommissioning*

DOE defines decommissioning in its Decommissioning Resource Manual, DOE/EM-0246, August 1995, to be that which takes place:

After deactivation and includes surveillance and maintenance, decontamination and/or dismantlement. These actions are taken at the end of life of the facility to retire it from service with adequate regard for the health and safety of workers and the public and protection of the environment. The ultimate goal of decommissioning is unrestricted release or restricted use of the site.

Surveillance and Maintenance is a program established during deactivation and continuing until phased out during decommissioning to provide in a cost effective manner for satisfactory containment of contamination; physical safety and security controls; and maintenance of the facility in a manner that is protective of workers, the public, and the environment. (Decommissioning Resource Manual, § 3.3.)

This definition confines the decommissioning phase in a facility's life cycle to the period following deactivation, defined below.

B. *Decontamination*

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The removal or reduction of radioactive or hazardous contamination from facilities, equipment or soils by washing, heating, chemical or electrochemical action, mechanical cleaning or other techniques to achieve a stated objective or end condition. (Decommissioning Resource Manual, § 3.3.)

"Decontamination" is not a phase in the life of a facility. Rather, it is a process that can be initiated at any point in the life of a facility to reduce system, structure, or component radioactivity and hazardous materials levels for a specific purpose.

C. *Deactivation*

The process of placing a facility in a safe and stable condition to minimize the long-term cost of a surveillance and maintenance program that is protective of workers, the public, and the environment until decommissioning is complete. Actions include the removal of fuel, draining and/or de-energizing of nonessential systems, removal of stored radioactive and hazardous materials and related actions. As the bridge between operations and decommissioning, based upon facility-specific considerations and final disposition plans, deactivation can accomplish operations-like activities such as final process runs, and also decontamination activities aimed at placing the facility in a safe and stable condition. (Decommissioning Resource Manual, § 3.3.) Deactivation does not include all decontamination necessary for the dismantlement and demolition phase of decommissioning, i.e., removal of contamination remaining in the fixed structures and equipment after deactivation.

D. *Dismantlement*

The disassembly or demolition and removal of any structure, system, or component during decommissioning and satisfactory interim or long-term disposal of the residue from all or portions of the facility. (Decommissioning Resource Manual, § 3.3.) Residue in this context refers only to contamination remaining in the fixed structures and equipment remaining after deactivation.

E. *Storage*

A process that takes place throughout the life of a facility, consisting of retrievable retention of material or waste pending final disposition.

F. *Decommissioning of Defense Nuclear Facilities*

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Regarding defense nuclear facilities in the context of the AEA, decommissioning includes the combined deactivation, decontamination, and dismantlement activities necessary to remove or reduce the radiological health and safety hazards of a facility to a level below which adequate protection of the health and safety of workers and the public can be assured without oversight. These actions ultimately render a facility incapable of functioning as a defense nuclear facility. At that point, the facility is "decommissioned." This definition of decommissioning for defense nuclear facilities subsumes the various DOE subdivisions of decommissioning, including "deactivation," "surveillance and maintenance," "decommissioning," and "dismantlement."

This particularized definition of decommissioning is included to illuminate the scope of the Board's statutory obligations regarding oversight of defense nuclear facilities.

G. *Defense Nuclear Facilities*

A Department of Energy nuclear production, utilization, or waste storage facility at any stage of its life cycle from design, construction, operation, to decommissioning, as further defined by the AEA.

H. *Plutonium Operations Buildings*

Those buildings at Rocky Flats, which, until fully decommissioned, store or contain plutonium metal or residue. See Public Law 102-190 at §§ 3133(a), (e). Such buildings may also be facilities containing RCRA mixed waste if plutonium or other radionuclides are contaminated with RCRA hazardous waste.

I. *Radioactive Materials and Waste*

1. *Special Nuclear Material*

Plutonium, uranium enriched in the isotope 233 or in the isotope 235, any other material artificially enriched by these materials, and any other materials identified by DOE or the NRC, as stated in AEA § 2014 (aa).

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2. *TRU Materials*

Elements that have an atomic number greater than 92 (uranium), including neptunium, plutonium, americium, and curium.

3. *TRU Waste*

Without regard to source or form, waste that is contaminated with alpha-emitting transuranium radionuclides with half-lives greater than 20 years and concentrations greater than 100 nCi/g at the time of assay.

4. *RCRA Mixed Hazardous and Radioactive Waste*

Waste that contains both hazardous waste subject to RCRA and source, special nuclear, or byproduct material subject to the Atomic Energy Act of 1954, as amended (42 U.S.C. § 2011 et seq.).

5. *Low Level Radioactive Waste*

Radioactive waste that is not high level waste, spent nuclear fuel, or byproduct material. Low-level radioactive waste is further defined in the Low Level Radioactive Waste Policy Act, codified in 42 U.S.C.A. § 2021b(9), and its attendant regulations.

6. *Mixed Low Level Radioactive Waste*

RCRA mixed waste, as defined above, where the radioactive component is low level radioactive waste, also as defined above.

7. *TRU-Mixed Waste*

RCRA mixed waste, as defined above, where the radioactive component is TRU waste, also as defined above.

J. *Regulatory Authority*

Regulatory authority is the ability, granted by statute, to oversee, control, direct, or restrict another person's or entity's action by regulation/rule or other legally enforceable order, specification, or requirement. Rulemaking, licensing,

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permitting, compliance, and enforcement actions are means by which an entity implements its regulatory authority.

K. *Independent Oversight Authority*

Independent oversight authority is the ability to scrutinize the programs and activities of another person or entity to determine compliance with an established set of legal or technical requirements. For purposes of this MOU, it includes investigative powers, performance of technical assessment, and submission of the results to the entity for corrective action.

Oversight is a function often performed by regulatory entities. However, oversight authority does not include a grant of full regulatory authority to control, direct, or restrict another's action by rules, orders, or requirements. Typical functions of an oversight entity are to investigate, observe, and evaluate performance against applicable requirements and standards, conduct technical assessments and hearings, gather technical information, and suggest corrective action to the overseen entity.

IV. RESPONSIBILITIES OF A PRIMARY ENTITY

DOE is responsible for all activities at RFETS, including: (1) remaining nuclear defense activities and deactivation under the AEA, subject to DNFSB oversight of safety in defense nuclear facilities; (2) compliance with applicable environmental laws and requirements, including permits and other requirements under RCRA and CHWA, subject to CDPHE regulation; and (3) hazardous substance and hazardous constituent removal, decommissioning and site remediation under applicable environmental laws and requirements, including CERCLA, CHWA, and RCRA, subject to EPA and CDPHE regulation. RFETS is now dedicated primarily to DOE waste management, environmental cleanup, and restoration activities, regulated by EPA and CDPHE. In making the transition from operational facilities, through deactivation, decommissioning, and environmental restoration, to materials storage and post-closure care, the regulatory and oversight entities must cooperate to make a smooth transition while maintaining adequate protection of the environment, safety, and health. Under this MOU, DOE will be subject to lead regulation or oversight by one of the three regulatory or oversight entities for each activity at RFETS covered by this MOU.

A primary regulatory or oversight entity shall be selected from EPA, CDPHE or DNFSB and shall:

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1. Fully execute its statutory responsibilities for regulation and oversight of DOE activities in a manner consistent with the roles ascribed to other entities in this MOU, to the extent allowed by law.
2. Investigate, evaluate, review, or inspect DOE facilities, and activities, as appropriate, and consult with the secondary entities regarding the evaluation, review, or inspection. Representatives of the other two entities may be present during evaluations or inspections and shall be entitled to share resulting inspection/evaluation information subject to the requirements of law, including those laws governing classified national security information, restricted data, and unclassified, controlled nuclear information. Review and concurrence will be sought by the primary entity from secondary entities with jurisdiction over aspects of an activity or material. In areas of expertise, entities with review and comment authority will consult, at their discretion, with the primary entity and offer appropriate comment on environmental, health, and safety issues.
3. Interact with DOE as the point of contact on behalf of all entities having responsibilities for regulation or oversight of a given activity or material. For example, the primary entity shall incorporate into its own review and findings, where appropriate, concerns or results submitted by secondary entities monitoring the activity; the primary entity shall resolve with DOE findings or comments by the secondary entities.
4. Consult with the secondary entity or entities prior to reviews, evaluations, or inspections to ensure that the requirements imposed on, and proposals made to, DOE for any given activity:
 - a. represent the complete set of requirements and corrective actions necessary for statutory compliance by DOE for protection of the health and safety of workers and the public and protection of the environment;
 - b. avoid duplication of effort by DOE or the primary entity;
 - c. are based upon those necessary for statutory compliance (which is not to say that DOE cannot voluntarily commit to activities which exceed minimum statutory requirements);
 - d. do not impose conflicting requirements; and

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- e. are, to the extent practicable, agreed upon by the primary and any secondary entities prior to commencement of work affected by the requirements and recommendations.
- 5. Review, with the secondary entity or entities, plans "up front" to ensure that requirements imposed on, and corrective actions proposed to, DOE meet the above criteria, with the goal being that activities subject to concurrent regulatory or oversight jurisdiction are not delayed by belated disagreements among the primary and secondary entities over the set of requirements to be imposed, or how those requirements are to be implemented.
- 6. Provide a smooth transition of regulatory or oversight leadership as activities in RFETS facilities shift from one phase or life cycle to another. The primary entity, in consultation with the entity which will become the primary entity after the transition, will determine when a particular activity or phase has been completed.

V. RESPONSIBILITIES OF A SECONDARY ENTITY

This MOU designates primary and secondary entities in those areas where the parties jointly have legal responsibilities to oversee or regulate the same RFETS activity. However, to the extent allowed by law, the secondary entity shall seek to execute its regulatory and oversight responsibilities by working with the primary entity for the particular activity and materials involved. (See Figure 1.) This cooperation is necessary to facilitate one of the most important purposes of this MOU: to provide DOE with a single coordinating regulatory or oversight entity for environmental, safety, and health regulation/oversight of each activity covered by this MOU. Secondary entities may not abdicate their statutory obligation to oversee/regulate activities within their jurisdiction. The dispute resolution and reserved authority clauses of this MOU may be invoked under the circumstances described in section VIII to resolve issues between the primary and secondary entities.

Secondary entities will either review the activities of primary entities and concur with those activities, or they will review and comment on those activities.

- Review and concurrence connotes the step a primary entity will take in seeking concurrence from a secondary entity, within its area of jurisdiction, over aspects of a regulatory or oversight action. Lack of concurrence indicates a need for further consultation between primary and secondary entities, but does not constitute a veto of the primary entity's proposed activity. A non-concurring secondary

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entity that cannot resolve its concerns through consultation with the primary entity shall initiate the dispute resolution process if required by section VIII of this MOU.

- Review and comment authority means that, in areas of expertise, secondary entities may, at their discretion, consult with the primary entity and offer appropriate comment on environmental, health, and safety issues.

VI. IDENTIFICATION OF THE PRIMARY ENTITY FOR VARIOUS ACTIVITIES AT ROCKY FLATS

A. SCOPE OF MOU COVERAGE

This MOU applies to activities in the area termed "the Industrial Area" at RFETS, both within buildings and in the environment directly associated with RFETS facilities. Many of these activities, depending on their nature, fall within the jurisdiction of one or more regulatory or oversight entities, as shown in Figure 1. For example, DOE maintains temporary storage of plutonium pits, uranium, and other defense materials, subject to DNFSB oversight, in certain facilities pending a decision on their final disposition. A small number of plutonium operations buildings will be utilized for stabilization of plutonium residues prior to final disposition of those residues, also subject to DNFSB oversight. Other buildings and equipment are used for the treatment, storage, and disposal of RCRA hazardous wastes, transuranic mixed waste, and other mixed RCRA waste containing both hazardous and radioactive waste. These activities are subject to CDPHE regulation, and mixed waste also is subject to DNFSB oversight. Portions of RFETS are contaminated from releases of hazardous substances and are regulated under the removal and remedial action provisions of CERCLA and the closure and corrective action provisions of RCRA/CHWA, subject to EPA and CDPHE regulation, as appropriate. The Rocky Flats Cleanup Agreement (RFCA) will address specific authority for environmental restoration.

B. ENTITY ROLES

The following designations identify the entity that will serve as the primary regulatory/oversight entity for various activities at facilities scheduled to be decommissioned at RFETS. These designations are displayed in Figure 1. Figure 1 also specifies subsidiary roles of secondary entities.

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In general, CDPHE has primary regulatory responsibility for hazardous waste treatment, storage, and disposal facilities at RFETS, pursuant to its RCRA/CHWA legal requirements. That responsibility includes regulation of hazardous waste and the hazardous component of mixed waste.

DNFSB has primary responsibility for temporary safe storage of plutonium pits, uranium, and other AEA special nuclear materials which are not waste, as well as low level radioactive waste, until final disposal; safety of plutonium and other SNM operations necessary to stabilize residues or to deactivate a facility; safe final disposition of SNM; and deactivation and decommissioning under the AEA of defense nuclear facilities that are not being operated pursuant to RCRA/CHWA treatment, storage or disposal permit. Within this context, DNFSB is responsible for determining whether DOE and its contractors are in compliance with all applicable DOE safety Orders, rules, and other requirements pertaining to nuclear safety at defense nuclear and nuclear storage facilities pursuant to the AEA. See 42 U.S.C. § 2286a(a). Under the RFCA, CDPHE has the lead for "decommissioning" activities subsequent to deactivation in accordance with the May 22, 1995 DOE/EPA Policy Statement.

EPA retains authority for final selection of remedial alternatives under CERCLA and will be the secondary entity for decommissioning activities where CDPHE is the designated primary entity.

Roles as primary or secondary entities for activities at a given facility, or for a given material, will change as the nature of the hazard or use changes during various phases such as deactivation, cleanup, etc. This MOU provides for a smooth transition of regulatory or oversight responsibilities through these phases. Even though facilities and materials have passed through a given phase, exigencies can result in a return to a prior phase. This could occur, for example, if a facility were decontaminated and all hazardous materials were removed, but later, radioactive materials were introduced for storage. Entity roles would then revert back to those appropriate for the new facility activity.

1. DOE

DOE manages and directs all Departmental and contractor activity at RFETS. DOE also has authority for regulation of production and utilization of source, special nuclear, and byproduct material under the AEA, subject to DNFSB oversight. DOE has lead agency authority for response action related to

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releases or threats of releases of hazardous substances under CERCLA and Executive Order 12580, subject to EPA regulation. However, for purposes of this MOU, DOE and its contractor will be considered the regulated entity.

2. CDPHE

- a. CDPHE will be primary entity, as shown in Figure 1, for the following activities:
 - (1) Regulation, oversight, and enforcement of RCRA and CHWA legal requirements for mixed waste (including generation, storage, treatment and disposal), with DNFSB review and concurrence for matters within its jurisdiction. (DNFSB involvement in this area will be limited to review and comment during decontamination of residual contamination of fixed structures, dismantlement, and demolition.) DNFSB technical comments may be incorporated, as appropriate, into applicable orders and permits, if consistent with applicable statutory authority and regulations, and existing permits and orders will be checked for consistency with DNFSB recommendations and resulting DOE commitments.
 - (2) As provided in the RFCA, regulation or oversight of decontamination and decommissioning of fixed structures and equipment, dismantlement, demolition, and closure of RCRA treatment, storage and disposal units, with DNFSB review and comment.
 - (3) Regulation of RCRA hazardous waste where not mixed with radioactive waste.
 - (4) Oversight of LLW and regulation of low-level mixed waste disposal on-site or elsewhere in the State of Colorado.
 - (5) Regulation of RCRA corrective actions and lead oversight of CERCLA response actions, as provided in the RFCA, with DNFSB review and comment regarding radioactive components of the waste, and consistent with DOE lead entity authority under Executive Order 12580 and the RFCA.

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- b. CDPHE will be a secondary entity, as shown in Figure 1, for:
- (1) Review and comment to DNFSB on operations, processing, storage, on-site transport, decontamination (not associated with decommissioning), deactivation (including removal of stored SNM and contained materials and waste), and disposal activities for radioactive materials, including SNM, TRU, and byproduct materials, except that CDPHE will review and concur on final disposition activities which occur in the State of Colorado.
 - (2) Review and concur with DNFSB on operations, processing, storage, on-site transport, decontamination (not associated with decommissioning), and deactivation (including removal of SNM, stored and contained materials, and waste) activities for LLW.

3. DNFSB

- a. DNFSB will be primary entity, as shown in Figure 1, for the following activities:
- (1) Determination that public health and safety are adequately protected prior to the Secretary of Energy's resumption of SNM operation in plutonium buildings at RFETS. See section 3133 of Public Law 102-190, the National Defense Authorization Act for FY 1992-93 (Dec. 5, 1991).
 - (2) Storage of source, special nuclear and byproduct materials as defined by 42 U.S.C.A. §§ 2014(e), (z) and (aa) ("AEA materials") which are not waste or mixed with a hazardous waste, with CDPHE review and comment to the extent authorized by the AEA and other criminal and civil provisions of law governing the disclosure of classified national security information, restricted data, and unclassified controlled nuclear information.
 - (3) The safe final disposition of AEA special nuclear material.
 - (4) Storage of high level, TRU, low level, and other non-mixed AEA radioactive waste not subject to NRC licensing. The

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Board also has concurrent oversight responsibility for storage of radioactive waste mixed with hazardous waste. See 3.b.(1) below.

- (5) Processing and deactivation operations involving AEA materials that are not mixed with hazardous waste, including for example, stabilization of stored special nuclear material residues or chemical separation of special nuclear materials from residues remaining in process systems.
 - (6) Deactivation and removal of SNM, AEA materials, and non-mixed AEA wastes which are stored or contained inside defense nuclear facility buildings. DNFSB's primary role will terminate once systems, structures and components have been decontaminated of radioactive materials to a level that does not constitute an undue risk to the health and safety of workers and the public. (See Figure 1: the bold horizontal line separating deactivation and disposal activities from "decommissioning" as defined by the DOE/EPA May 22, 1995, Policy Statement.)
- b. DNFSB will be secondary entity, as shown in Figure 1, for the following activities:
- (1) Review and concur on operations and processing, storage, deactivation, decontamination, and disposal activities involving the hazards and risks associated with the radioactive component of mixed waste.
 - (2) Review and comment on activities involving cleanup of radioactive materials in the environment, when requested.
 - (3) Review and comment on the final disposition of low level radioactive waste, if in the State of Colorado.
 - (4) Review and comment on activities involving the decontamination of residual contamination of fixed structures for all radioactive and mixed wastes.

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- (5) Review and comment on activities involving dismantlement and demolition related to all radioactive and mixed wastes.

4. EPA

- a. EPA retains authority for final selection of remedial alternatives under CERCLA, consistent with Executive Order 12580, as shown in Figure 1.
- b. EPA may, within its discretion, provide review and comment to CDPHE, as appropriate, within areas of its expertise and jurisdiction. See Figure 1.

VII. INTEGRATION OF ONGOING ACTIVITIES

An extraordinary number of ongoing environmental, safety, and health activities are being conducted at RFETS which must be integrated with the protocols of this MOU. For example, many facilities are subject to regulation under RCRA and CHWA. Cleanup is being conducted pursuant to CERCLA, RCRA, and CHWA. There are extant court decisions and consent orders which must be complied with. The Board has issued a number of Recommendations, including 94-1 on stabilization of SNM materials and 94-2 on low level waste, which apply to RFETS activities. Integration of these activities will require extensive effort by DOE and the regulatory/oversight entities immediately upon execution of this MOU. To a degree, however, these pre-existing environmental, safety and health requirements and activities were significant factors in the selection of the primary regulatory/oversight entities.

VIII. DISPUTE RESOLUTION

Conflicts can occur when a "secondary" entity has reason to believe that its interests are not adequately represented by a primary entity. This could occur, for example, if a party to the agreement alleges that DOE or its contractor has not complied with environment, safety, and health requirements and standards adopted by DOE, and accepted by the primary and secondary entities.

Should a conflict occur, a secondary entity shall work expeditiously with the primary entity to resolve the conflict, and not bypass the primary entity to resolve the conflict with DOE unless the conflict, if not quickly resolved, would result in an imminent threat to worker or public health and safety, an emergency, or a large expenditure of resources

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if resolution is delayed. In this event, the secondary entity may bring the matter directly to the attention of appropriate DOE personnel.

With the exception of imminent threats to safety and the potential for wasted resources discussed above, a secondary entity shall bring a conflict to the attention of the primary entity's representative for the activity. Where possible, the representative shall resolve the conflict with minimal impact on the activity. If resolution at the representative level is not possible, the next higher level of management shall address and resolve the conflict or elevate the conflict to the next level of management. If the secondary entity determines that the conflict is not being addressed adequately, it shall notify the primary entity that the secondary entity intends to request DOE to participate in the resolution.

If DOE does not resolve a problem to the satisfaction of the primary or secondary entity, either entity may take the lead in resolving the problem through use of its independent regulatory or oversight authority subject to the dispute resolution clause of the RFCA in the case of EPA or CDPHE. All disputes shall be resolved within thirty days with the primary entity, or the secondary entity may exercise its reserved authority.

IX. RESERVED STATUTORY AUTHORITY

CDPHE administers hazardous waste permits, compliance, and other programs under RCRA, CHWA, and CERCLA. By statute, the Defense Nuclear Facilities Safety Board must recommend to the Secretary of Energy, or the President in appropriate circumstances, those measures necessary to adequately protect public health and safety at defense nuclear facilities. Each of the entities, including DOE, has a statutory obligation to respond to emergencies or severe or imminent threats to public health, safety, and the environment. EPA and DOE (and, where authorized by EPA, CDPHE), under CERCLA, must respond to hazardous substance releases or substantial threats of release which constitute an imminent and substantial endangerment. DNFSB under the AEA must take action on imminent or severe threats to public health and safety, and CDPHE must take action to protect the health and safety of its citizens from emergencies. Nothing in this MOU shall be construed to restrain an entity from taking appropriate action under its organic or other applicable statutes, including actions based on the entity's judgments regarding its resources and priorities. Moreover, in the event a dispute cannot be resolved by resort to the resolution process specified by the previous provision, a secondary entity may exercise any of its statutory regulatory or oversight authorities.

Memorandum of Understanding

This MOU shall take effect after signing by authorized representatives of the respective entities. The parties to this MOU may modify or terminate the MOU by written agreement of all the parties.

Dated at Denver, Colorado this 1st day of March, 1996.

For the Defense Nuclear Facilities Safety Board,

/s/
John T. Conway
Chairman

For the United States Department of Energy,

/s/
Mark N. Silverman
Manager, Rocky Flats Field Office

For the United States Environmental Protection Agency,

/s/
Jack W. McGraw
Deputy Regional Administrator,
EPA Region VIII

Memorandum of Understanding

For the Colorado Department of Public Health and Environment,

/s/
Thomas P. Looby
Director, Office of Environment

DOE DIRECTS AND MANAGES ALL ACTIVITIES AT RFETS

ROLES AND RESPONSIBILITIES FOR ACTIVITIES IN THE INDUSTRIAL AREA AT RFETS

DOE DIRECTS AND MANAGES ALL ACTIVITIES AT RFETS

MATERIAL/ WASTE ACTIVITY	RADIOACTIVE MATERIALS SNM, TRU, Byproduct	LOW LEVEL RADIOACTIVE WASTE	SOLID/LIQUID MIXED TRU WASTE (RCRA Waste)	LOW LEVEL MIXED WASTE (RCRA waste)	HAZARDOUS AND SOLID WASTE	†CERCLA/RCRA MATERIALS IN ENVIRONMENT
Operations and Processing	DNFSB Primary CDPHE Review and Comment	DNFSB Primary CDPHE Review and Concur	CDPHE Primary DNFSB Review and Concur	CDPHE Primary DNFSB Review and Concur	CDPHE Primary	CDPHE Primary
Storage, On-Site Transport , and Decontamination (unassociated with decommissioning)	DNFSB Primary CDPHE Review and Comment	DNFSB Primary CDPHE Review and Concur	CDPHE Primary DNFSB Review and Concur ‡	CDPHE Primary DNFSB Review and Concur	CDPHE Primary	CDPHE Primary
Deactivation including removal of SNM stored and contained materials and waste	DNFSB Primary CDPHE Review and Comment	DNFSB Primary CDPHE Review and Concur	CDPHE Primary DNFSB Review and Concur	CDPHE Primary DNFSB Review and Concur	CDPHE Primary	CDPHE Primary
Final disposition, or disposal within Colorado	DNFSB Primary CDPHE Review and Comment ††	CDPHE Primary DNFSB Review and Concur	CDPHE Primary DNFSB Review and Concur	CDPHE Primary DNFSB Review and Concur	CDPHE Primary	CDPHE Primary
Decontamination of residual contamination of fixed structures	CDPHE Primary EPA Review and Comment	CDPHE Primary EPA Review and Comment	CDPHE Primary EPA Review and Comment	CDPHE Primary EPA Review and Comment	CDPHE Primary EPA Review and Comment	CDPHE EPA Review and Comment
	DNFSB Review and Comment	DNFSB Review and Comment	DNFSB Review and Comment	DNFSB Review and Comment		
Dismantlement and Demolition	CDPHE Primary EPA Review and Comment	CDPHE Primary EPA Review and Comment	CDPHE Primary EPA Review and Comment	CDPHE Primary EPA Review and Comment	CDPHE Primary EPA Review and Comment	CDPHE EPA Review and Comment
	DNFSB Review and Comment	DNFSB Review and Comment	DNFSB Review and Comment	DNFSB Review and Comment		

Decommissioning
(DOE/EPA Policy)

- † EPA retains final signature authority on the "record of decision" for final selection of remedial alternative, and DNFSB provides comment in areas of expertise upon request.
- †† Review and Concur if final disposition or disposal is in the State of Colorado.
- ‡ DNFSB has statutory oversight responsibility for nuclear waste storage. 42 U.S.C. § 2286g(2).

Legend:

CDPHE Primary
EPA Secondary
DNFSB Secondary

CDPHE Primary
DNFSB Secondary

DNFSB Primary
CDPHE Secondary

DNFSB/DOE 12/20/95

Final RCRA
Appendix 1
July 19, 1996

834/1724

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“Final Rocky Flats Cleanup Agreement”

APPENDIX 2

PRINCIPLES FOR EFFECTIVE DIALOGUE AND COMMUNICATION AT ROCKY FLATS

Principles for Effective Dialogue
and Communication at Rocky Flats

We the undersigned commit to using these "Principles for Effective Dialogue and Communication at Rocky Flats" in all interactions at Rocky Flats. Furthermore, all staff involved with Rocky Flats issues at the Colorado Department of Public Health and Environment, Environmental Protection Agency, and Rocky Flats Environmental Technology Site should use these Principles in their interactions and decision-making processes, both formal and informal.

1. It is recognized that all three Parties have distinct roles and independent decision-making responsibilities that they must consider throughout both the formal and informal aspects of decision-making of Rocky Flats issues.
2. At all phases of interaction and decision making, and especially at the early phase of work planning among the lowest working levels possible, staff should engage in interagency dialogue that is aimed at:
 - sharing all relevant information;
 - being honest about their own underlying needs and constraints by clarifying the rationale for such needs and limitations through open communication;
 - striving to understand the views and rationales expressed by other Parties;
 - being reasonable, flexible and creative; and
 - solving real problems and achieving environmental results.
3. The goal of interagency dialogue is to achieve consensus on identifying problems and making decisions related to those problems. At the very least, consensus solutions are those that each party is able to live with. At their best, consensus solutions are "win/win" outcomes where truly creative solutions can be found to the complex problems that must be addressed at Rocky Flats.
4. It is understood that the use of a dialogue process is rooted in a shared vision for the site, and shared goals and objectives for achieving the vision. The shared vision, goals and objectives must be arrived at in a consensus process, clearly communicated, and frequently referred to.
5. It is recognized that there are legitimate differences in the underlying needs and interests of the Parties and consensus on specific actions may not always be possible. However, the

inability to achieve consensus should not be considered a failure of the dialogue process. Rather, the dialogue process should be considered a failure if there is a lack of clarity and understanding about why each party is taking the position they are taking.

6. The dialogue process above is a philosophy that should apply to all interactions at Rocky Flats. However, all Parties recognize that informal, consensus-oriented dialogue about specific issues cannot continue indefinitely. Such dialogue should continue until consensus is achieved in a reasonable period of time or until all participating Parties believe they have a complete understanding of their respective views and the reasons why they disagree. In those instances where consensus cannot be achieved, the Parties recognize that formal decision-making processes will be used to reconcile differences. The underlying approach described here should not end at this point, but be carried forward into the formal decision-making process.

/s/ EPA

/s/ DOE

/s/ CDPHE

APPENDIX 3

IMPLEMENTATION GUIDANCE DOCUMENT

**Rocky Flats Cleanup Agreement, Appendix 3
RFCA Implementation Guidance Document
Final**

**A Working Group Product of
CDPHE
DOE RFFO
EPA
Kaiser-Hill
RMRS**

July 1999

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ACRONYMS

AFP	Approved Funding Program
APO	Analytical Project Office
ALARA	As Low As Reasonably Achievable
ALF	RFCA Action Levels and Standards Framework for Surface Water, Groundwater, and Soils
ANSI/ASQC	American National Standard Institute/American Society for Quality Control
AOC	Area of Concern
APEN	Air Pollution Emission Notices
AR	Administrative Record
ARAR	Applicable or Relevant and Appropriate Requirement
ASD	Analytical Services Division
AST	Analytical Services Toolkit
ASTM	American Society of Testing and Materials
BRA	Baseline Risk Assessment
CAA	Clean Air Act and Amendments
CAD/ROD	Corrective Action Decision/Record of Decision
CAPCD	Colorado Air Pollution Control Division
CAMU	Corrective Action Management Unit
CDPHE	Colorado Department of Public Health and Environment
CDD	Closure Description Document
CEARP	Comprehensive Environmental Analysis and Response Program
C/ED	DOE Office of Communication and Economic Development
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHWA	Colorado Hazardous Waste Act
CMS/FS	Corrective Measure Study/Feasibility Study
COC	Chemical of Concern
COCs	Contaminants of Concern
CPB	Closure Project Baseline
CPS	Closure Project Schedule
CR	Continuing Resolution
CRA	Comprehensive Sitewide Risk Assessment
CWA	Clean Water Act
CWQCC	Colorado Water Quality Control Commission
CWTF	Consolidated Water Treatment Facility
D&D	Decontamination and Decommissioning
DMP	Data Management Plan
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
DOP	Decommissioning Operations Plan
DPP	Decommissioning Program Plan
DQO	Data Quality Objective
DRC	Dispute Resolution Committee

EDD	Electronic Data Deliverable
EDDIE	Environmental Data Dynamic Information Exchange
EE/CA	Engineering Evaluation/Cost Assessment
EPA	Environmental Protection Agency
ER	Environmental Restoration
ERA	Ecological Risk Assessment
ERAM	Ecological Risk Assessment Methodology
FFCA	Federal Facility Compliance Act
FIP	Field Implementation Plan
FSP	Field Sampling Plan
FY	Fiscal Year
GRA	General Response Actions
HA	Hazard Analysis
HASP	Health and Safety Plan
HHRAM	Human Health Risk Assessment Methodology
HPGe	High Purity Germanium
HQ	DOE Headquarters
HRR	Historical Release Report
HWIR	Hazardous Waste Identification Rule
IAG	Interagency Agreement
IA IM/IRA	Industrial Area Interim Measures/Interim Remedial Action Decision Document
IDM	Investigative Derived Materials
IGD	Implementation Guidance Document
IHSS	Individual Hazardous Substance Site
IM/IRA	Interim Measure/Interim Remedial Action
IMP	Integrated Monitoring Plan
INV	Needs Further Investigation
ISB	Integrated Sitewide Baseline
ISEDS	Integrated Sitewide Environmental Data Systems
ISM	Integrated Safety Management
IWMP	Integrated Water Management Plan
LDR	Land Disposal Restrictions
LRA	Lead Regulatory Agency
M2SD	Mean Plus Two Standard Deviations
MAL	Master Activity List
MBTA	Migratory Bird Treaty Act
MCL	Maximum Contaminant Level
MCS	Management Control System
NCP	National Contingency Plan
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NFA	No Action/No Further Action
NLR	No Longer Representative

NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRMP	Natural Resources Management Policy
OC	Office of Communication
OMB	Office of Management and Budget
OSHA	Occupational Safety and Health Act
OU	Operable Unit
PAC	Potential Area of Concern
PAM	Proposed Action Memorandum
PARCC	Precision, Accuracy, Representatives, Completeness, Comparability
PBD	Project Baseline Description
PCB	Polychlorinated Biphenyl
PCOC	Potential Chemicals of Concern
PEG	Program Execution Guidance
POC	Points of Compliance
PP	Proposed Plan
PP/CAD/ROD	Proposed Plan/Corrective Action Decision/Record of Decision
PPE	Personal Protective Equipment
PPRG	Programmatic Preliminary Remediation Goal
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QAPjP	Quality Assurance Project Plan
QC	Quality Control
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFCAB	Rocky Flats Citizens Advisory Board
RFEDS	Rocky Flats Environmental Data System
RFETS	Rocky Flats Environmental Technology Site
RFFO	Rocky Flats Field Office
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RFSIPI	Rocky Flats Sitewide Integrated Public Involvement Plan
RI/FS	Remedial Investigation/Feasibility Study
RPD	Relative Percent Difference
RPO	Representative Process Options
RSOP	RFCA Standard Operating Protocols
SAFER	Streamlined Approach for Environmental Restoration
SAP	Sampling and Analysis Plan
SCCB	Site Change Control Board
SEC	Senior Executive Committee
SEDRC	State-EPA Dispute Resolution Committee
SESEC	State-EPA Senior Executive Committee
SNM	Special Nuclear Material
SRA	Support Regulatory Agency

STARR	Site Technical Administrative Record Review
SWD	Soil and Water Database
TM	Technical Memorandum
TSCA	Toxic Substance Control Act
TSD	Treatment Storage and Disposal
UBC	Under Building Contamination
USACE	United States Army Corps of Engineers
UCL95	95% Upper Confidence Limit
UTL	Upper Tolerance Level
VOCs	Volatile Organic Compounds
WAC	Waste Acceptance Criteria
WPD	Work Proposal Document
WWW	World Wide Web

1. INTRODUCTION

1.1. SCOPE AND PURPOSE OF ROCKY FLATS CLEANUP AGREEMENT AND IMPLEMENTATION GUIDANCE DOCUMENT

The Rocky Flats Cleanup Agreement (RFCA) describes the regulatory framework for performing Environmental Restoration (ER) and decommissioning activities at the Rocky Flats Environmental Technology Site (RFETS or site; Site is considered the Comprehensive Environmental Response Compensation and Liability Act [CERCLA] definition as described in RFCA ¶25 bj and bl). RFCA replaces the 1991 Interagency Agreement (IAG) (DOE, 1991). RFCA parties are the Department of Energy (DOE) (the DOE Rocky Flats Field Office is herein denoted as DOE RFFO and DOE Headquarters is denoted as DOE HQ), the Environmental Protection Agency Region VIII (EPA), and the Colorado Department of Public Health and Environment (CDPHE). The RFCA requires the preparation of an Implementation Guidance Document (IGD). (See RFCA ¶78). The IGD is a tool that the RFCA parties use to guide the planning, decision making, and implementation of ER and decommissioning at the RFETS. The IGD is updated periodically as the site closure progresses to address modifications or changes to the RFCA process.

Consistent with RFCA ¶25aj, the IGD contains information on:

- Technical approach
- Content of specific decision documents
- Implementation of accelerated actions and decommissioning
- Risk assessment

The intended purposes of the IGD are to:

- Provide a "roadmap" for project managers
- Promote the understanding and compliance of non-RFCA authorities
- Standardize and expedite the planning and execution of work
- Provide additional interpretation/clarification of RFCA
- Illustrate the procedures for work prioritization and budgeting

Project management must address a variety of RFCA topics during the planning and execution of work. The IGD organizes RFCA subject matter in a manner that highlights relevant language that may be widely distributed throughout RFCA text. In this way, the IGD is a roadmap to relevant RFCA language that must be incorporated into the closure process.

While RFCA is a broad regulatory agreement that will be the primary authority for decommissioning and ER, other independent regulatory authorities must also be considered and addressed. As such, an additional purpose of the IGD is to identify regulatory authorities

external to RFCA, to promote their consideration, and to ensure that these external authorities are addressed.

The IGD provides sample schedules, sample tables of contents, and other discussion materials to standardize work planning and execution. Although the IGD is not enforceable, a commitment by the parties to accomplish work within the schedules provided will make parties accountable and expedite work. In addition, without a clear commitment from the parties to honor the scheduling developed during project scoping, it will be difficult to establish meaningful budgets that optimize funding.

Many complex technical and regulatory issues are within the scope of RFCA. It is impossible to craft a legal agreement that will, without interpretation, provide unambiguous language that covers every instance. For this reason, in some circumstances, the IGD will provide clarification to RFCA. The IGD will be particularly useful when procedural nuances have not been explicitly addressed; the IGD consensus process will determine appropriate terms under which the planning and execution of work will be accomplished on a project-specific basis.

Finally, the IGD provides illustrations to aid understanding of the RFETS work prioritization and budgeting process. This multi-step process represents a cooperative risk management exercise that is a vital element in the process to move RFETS through CERCLA; Resource Conservation and Recovery Act (RCRA); and Colorado Hazardous Waste Act (CHWA) process to closure.

1.2. ORGANIZATIONAL AND FUNCTIONAL RESPONSIBILITIES

One purpose of RFCA is to integrate CERCLA, RCRA, and CHWA regulatory authorities in a manner that minimizes conflict and expedites action. To that end, a stated objective of the IGD is to employ the same basic approach regardless of whether the work is related to the Industrial Area or the Buffer Zone. (See RFCA ¶78). RFCA also seeks to eliminate unnecessary tasks and duplicate reviews, and to minimize the impact of overlapping statutory authorities. (See RFCA ¶251 and ¶250).

RFCA provides for a Lead Regulatory Agency (LRA) and Support Regulatory Agency (SRA) and prescribes the responsibilities of each. In ¶25aq, RFCA defines the LRA as:

...that regulatory agency (EPA or CDPHE) which is assigned approval responsibility with respect to actions under this Agreement at a Particular Operable Unit.... In addition to its approval role, the LRA will function as the primary communication and correspondence point of contact. The LRA will coordinate technical reviews with the Support Regulatory Agency and consolidate comments, assuring technical and regulatory consistency, and assuring that all regulatory requirements are addressed.

In ¶25br, RFCA defines the SRA as:

...the regulatory agency (EPA or CDPHE) that, for purposes of streamlining implementation of this Agreement, where applicable, shall defer exercise of its regulatory authority at one or more particular OUs (Operable Unit) until the completion of all accelerated actions. The SRA may, however, provide comments to the LRA regarding proposed documents and work.

In addition, ¶57 of RFCA obligates each party to prepare a written description of its internal organization to be included in the IGD. Each party must designate one or more individuals to perform the functions of project coordinator. This designation may be changed by written notification to the other parties. Each party must also specify one or more points of contact for sending, receiving, and distributing correspondence.

The following sections provide the required description of key functional areas for each RFCA party. Updates will be incorporated on an as-needed basis.

1.2.1. CDPHE Internal Organization and Project Coordinators

Project Coordinator: Steve Gunderson, (303) 692-3367

Address: Colorado Department Public Health & Environment
HMWMD-B2
4300 Cherry Creek Drive South
Denver, Colorado 80246-1530

Facsimile: (303) 759-5355

Dispute Resolution Committee: Howard Roitman
Senior Executive Committee: Pat Teegarden

1.2.2. DOE Internal Organization and Project Coordinators

Project Coordinator: Joe Legare, (303) 966-2282

Address: Rocky Flats Field Office
P.O. Box 928
Golden, Colorado 80402-0928

Facsimile: (303) 966-2995

Dispute Resolution Committee: Joe Legare

Senior Executive Committee: Jessie M. Roberson

1.2.3. EPA Internal Organization and Project Coordinators

Project Coordinator: Tim Rehder, (303) 312-6293

Address: 999 18th Street, Suite 500
Denver, Colorado 80202

Facsimile: (303) 312-6067

Dispute Resolution Committee: Max Dodson
Senior Executive Committee: Jack McGraw

1.3. ENFORCEABILITY OF RFCA, ATTACHMENTS, APPENDICES, AND IGD

CHWA permits, Clean Air Act (CAA) permits, National Pollutant Discharge Elimination System (NPDES) permits, and National Environmental Policy Act (NEPA) obligations are outside of RFCA jurisdiction. Regardless, the RFCA does provide mechanisms to integrate these permits with the activities that are subject to RFCA. Specifically, RFCA addresses:

- Remedial activities for Individual Hazardous Substance Sites (IHSSs)
- Decommissioning
- Federal Facility Compliance Act (FFCA) compliance for mixed wastes that are not proposed for treatment under the Site Treatment Plan
- Timely completion of milestones
- Closure of underground storage tanks

Within this realm, RFCA consists of a hierarchy of documents with distinct legal enforceability. The preamble to RFCA, the IGD, and the RFCA appendices are not enforceable, while the body of the RFCA and RFCA attachments are enforceable. Consistent with its title, the IGD is a guidance document and is not binding on DOE, CDPHE or EPA, but will be used by the parties for reviewing the adequacy of documents and work. Approved decision are enforceable.

1.4. OVERVIEW OF THE IGD

The IGD consists of five major sections: (1) Introduction; (2) Project Scoping and Regulatory Integration; (3) Technical Approach and Procedures; (4) Administration; and (5) Public Involvement and Stakeholder Support. The Introduction discusses the scope and purpose of the IGD, the organizational and functional responsibilities of each party, and the enforceability of the IGD. The process for project scoping and the impact of RFCA on

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regulatory integration is discussed in Section 2. Section 3 provides technical and procedural detail related to the basic decision tools embodied in RFCA. Additionally, Section 3 presents a discussion of technical aspects of other supporting activities that are necessary components of the combined RCRA Corrective Action/CERCLA process. Examples include risk assessment and Applicable or Relevant and Appropriate Requirement (ARAR) analysis. Section 4 focuses on planning, budgeting, and administration of RFCA record keeping obligations. Processes to promote community involvement are presented in Section 5.

2. PROJECT SCOPING AND REGULATORY INTEGRATION

A stated goal of RFCA is to streamline the decision-making process. To accomplish this, RFCA clarifies each party's role in decision making and the legal and regulatory authorities under which the decisions are to be made. RFCA also seeks to create procedures that combine the CERCLA, RCRA, and CHWA requirements so that activities conducted pursuant to the RFCA will satisfy CERCLA, RCRA, and the CHWA statutory requirements without duplicative paperwork.

One mechanism to promote streamlined decision making is project scoping. RFCA defines scoping as:

... that period of time, from initial conceptual development of proposed work to DOE's formal request for approval to perform work on an activity, during which DOE consults with the regulators regarding the goals, methods, breadth and desired outcome for such activity. (See RFCA ¶25bk).

2.1. OUTLINE FOR PROJECT SCOPING

Project scoping offers an early opportunity for the parties to evaluate and refine technical attributes of the proposed project and to evaluate the regulatory framework, including permitting requirements, within which the project will be conducted. Additionally, project scoping is an opportunity to define how the variety of RFCA requirements and procedures will be implemented. Careful project scoping provides an opportunity to resolve many issues. The overall purpose, process, and factors for project scoping are outlined below.

Purpose and Approach

- To speed decision making and cleanup through
 - Early identification of regulatory, physical, and resource barriers
 - A common understanding of goal and path
- To create a better product by using the experience and wisdom of more people

Scoping Process

- Identify key parties
- Provide information on proposed activity to each party
- Meet to scope the project

Factors in Scoping

- Purpose and goal of project

- Regulatory authorities
 - RFCA
 - Authorities external to RFCA
- Decision-makers
 - EPA
 - CDPHE
 - DOE
 - Others
- Identify critical path events and time lines
- Integration issues
 - Waste management
 - Water management
 - Air
 - NEPA
 - Ecological concerns
 - Deactivation integration with decommissioning
 - Decommissioning integration with ER

2.2. SCOPING PROCESS

As the first step in the initiation of a RFCA activity, a scoping meeting will be held between EPA, CDPHE, and DOE RFFO to coordinate the RFCA requirements. Consistent with the RFCA, the LRA designation will be based upon the location at which the activity will be conducted. The purpose of the meeting is to discuss the regulatory requirements and to agree on the scope of the action and the content of the decision document. Consistent with RFCA §§ 89 and 107, estimated agency review times for Interim Measures/Interim Remedial Actions (IM/IRAs) will be determined. This is not necessary when scoping a Proposed Action Memoranda (PAM) because RFCA is quite specific regarding review duration. Permits that may be needed or that would otherwise be required in the absence of CERCLA §121(e)(1) and the National Contingency Plan (NCP) will be identified during the meeting. At the meeting, the LRA will inform DOE RFFO of the specific performance standards to be addressed within the decision document. Performance standards are generally expected to be based on the RFCA Action Levels and Standards Framework for Surface Water, Groundwater, and Soils (ALF), ARARs, or the Building Disposition guidelines in Attachment 9 of RFCA.

During scoping, one of three permit-related actions may occur:

- (1) If the activity is exempt from permitting DOE RFFO will: 1) identify any permit that would have been required; 2) identify the standards, requirements or limitations imposed upon the response action; and 3) propose how the response action will meet the standards, requirements or limitations. (See RFCA §17). This process will be identical to and coincide with the identification and resolution of ARARs for the

response action. Consistent with RFCA ¶18, EPA and CDPHE will provide their positions on any permit waivers in a timely manner.

- (2) If permits are required for off-site activities, DOE RFFO will notify and, upon request, provide CDPHE and EPA with copies of the permit applications. (See RFCA ¶20).
- (3) CDPHE will determine the need for permits for any RFCA non-decommissioning activity conducted in the Industrial Area so that appropriate permit application documentation may be submitted with the decision document for concurrent public review and approval. (See RFCA ¶103 and ¶104).

2.3. IDENTIFICATION OF SCOPE AND AUTHORITIES

CERCLA, RCRA, and CHWA are the underlying regulatory authorities for RFCA. RFCA directly defines the limits of the CERCLA/RCRA/CHWA cleanup authorities and directly facilitates the integration of the CERCLA/RCRA/CHWA cleanup authorities where they may overlap. In the process of defining the limits of the CERCLA/RCRA/CHWA cleanup authorities embodied in RFCA, RFCA also serves to directly and indirectly clarify the interface of the CERCLA/RCRA/CHWA cleanup authorities with other regulatory authorities that are external to RFCA.

To illustrate this point, the following two lists were prepared. The first list outlines the scope of RFCA. The second list outlines regulatory authorities that are outside the scope of RFCA but will be integrated with RFCA activities. Where RFCA gives CDPHE procedural discretion, an item will appear on both lists and will be designated as "elective."

RFCA Scope

- Decommissioning
 - Decontamination
 - Demolition
 - Dismantlement
- Environmental Restoration
 - Accelerated actions
 - Remedial action
 - Remediation waste management in Corrective Action Management Unit (CAMU)
 - Risk evaluations
 - ARARs
- Corrective Action Decision/Record of Decision (CAD/ROD)
- Modifications to decision documents
- RCRA closure

- Permitted units (elective)
 - Interim status closure (elective)
 - Final disposition of idle equipment (elective)
- Budget planning – Closure Project Baseline (CPB)
- Administrative Record (AR)
- RFCA Dispute Resolution
- Public involvement

Scope External to RFCA

- Deactivation
- Non-hazardous radioactive waste management
- RCRA process waste management/Part B Permit
 - Waste storage
 - Treatment to meet land disposal restrictions (LDR)
 - On-site disposal (optional)
- RCRA closure
 - Permitted units (elective)
 - Interim status closure (elective)
 - Final disposition of idle equipment (elective)
- NEPA
- Air permitting and National Emission Standards for Hazardous Air Pollutants (NESHAP)
- NPDES (wastewater) and stormwater permitting
- Ecological concerns
- Natural resource damage assessment
- DOE Orders
- Toxic Substances Control Act (TSCA)

The RFCA scope and authorities are discussed in detail in Section 3.0 and associated appendices. The authorities and scope external to RFCA are discussed in Section 2.6.

2.4. DECISION MAKING UNDER RFCA

Although the underlying CERCLA and CHWA substantive authorities held by EPA and CDPHE remain unchanged by RFCA, the assignment of lead and support roles by RFCA has significant procedural effects on decision making and dispute resolution. One example is the consolidation of air permit review and public comment with the RFCA decision process for an accelerated action.

RFCA combines three administrative structures to accomplish the integration of underlying CERCLA and CHWA cleanup authorities. First, RFETS has been divided into the Industrial Area and the Buffer Zone. Second, the RFCA provides for a LRA and a SRA.

The combined effect of these RFCA administrative structures is to assign the lead role to CDPHE in the Industrial Area and the lead role to EPA in the Buffer Zone. (See RFCA ¶67). The third administrative structure creates a class of "site-wide" issues. A list of site-wide documents is provided in RFCA ¶119. In contrast to the Industrial Area/Buffer Zone division of authority described above, site-wide documents and activities are subject to joint review and approval by CDPHE and EPA. For example, the Integrated Monitoring Plan (IMP) is a site-wide document that integrates a variety of monitoring obligations imposed under RFCA authorities and under authorities external to RFCA. The IMP summarizes Site-wide monitoring requirements for air, surface water, groundwater, and ecology.

Figure 2-1 is a simplified illustration of RFCA's assignment of lead responsibility (primary oversight) for activities at RFETS. It should be understood that Figure 2-1 includes both activities subject to RFCA authority and activities external to the RFCA, like deactivation, which is overseen by the Defense Nuclear Safety Board (DNFSB). Details of activities involving the DNFSB are provided in Appendix 1 of RFCA.

In addition, the figure has been simplified for clarity and may not accurately depict the relative amount of work (e.g., the amount of remediation in the Industrial Area versus the amount of remediation in the Buffer Zone) or accurately depict every jurisdictional possibility. For instance, only very limited circumstances may exist where EPA will be the lead for decommissioning conducted in the Buffer Zone. Finally, this figure shows that all activities conducted at the site are part of the CPB (formerly called the Integrated Site-wide Baseline), which is discussed in Section 4.1.

2.5. AUTHORITIES AND SCOPE EXTERNAL TO RFCA

As noted earlier, a number of regulatory authorities external to RFCA need to be integrated with RFCA activities. It will be necessary to coordinate these external authorities during project scoping and during project implementation if there are any deviations from the planned action location or process on which the initial coordination was based. (See Kaiser-Hill Company, LLC [K-H] Directive, "Site Activity Environmental Assessment.") These external authorities can be critical to timely project implementation. To facilitate the coordination, RFETS has created an Environmental Checklist to ensure that each internal and external authority is considered (see Appendix A). Because the RFETS Environmental Checklist is revised periodically, it is necessary to obtain the most recent version from the RFETS NEPA group.

External regulatory authorities that need to be integrated into RFCA Activities are:

- Waste Management
- Water (Wastewater, Spills)
- NEPA
- Air
- Ecology

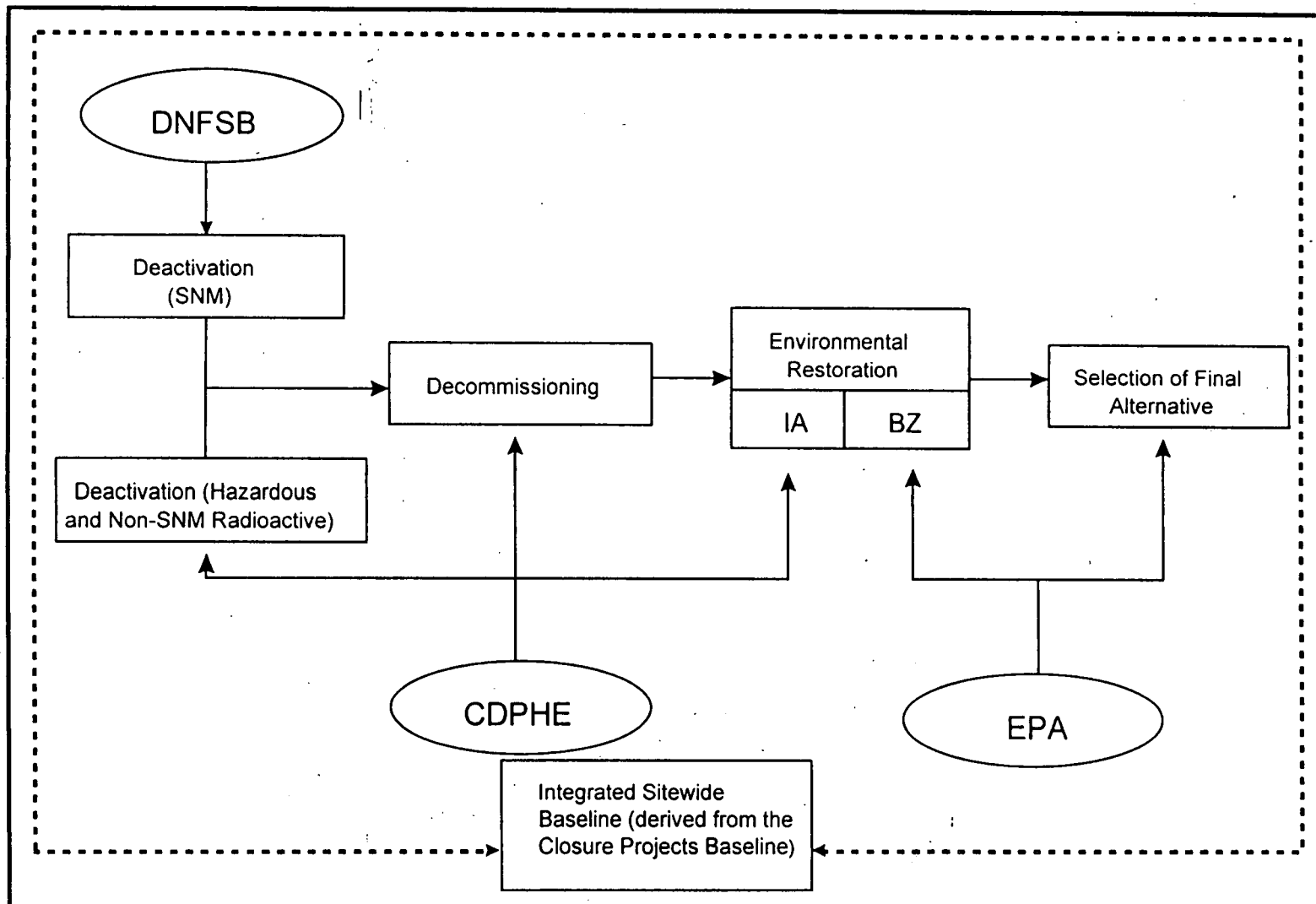


Figure 2-1 Primary Oversight and Facility Disposition Flow

KEY
IA = Industrial Area
BZ = Buffer Zone

- Health and Safety

Each of these authorities is discussed in the following sections.

2.5.1. Waste Management

Waste management activities are subject to requirements external to RFCA that are dependent upon the levels of radioactivity, the types of hazards, and the management strategy employed. As a result, the amount of waste anticipated from the activity must be evaluated so that on-site storage capacity, on-site or off-site treatment capability (as needed), and final off-site disposal options are identified. This evaluation is critical due to limited capacity for on-site storage, limited on-site and off-site treatment capabilities, restrictive waste acceptance criteria at currently licensed/permitted off-site disposal facilities, and the cost of waste management.

Project-Specific Waste Management Strategy

Two approaches will help complete this evaluation:

- (1) Project-specific waste management strategy
- (2) CERCLA Permit waivers

Each are discussed in the following paragraphs.

During scoping it is necessary to identify a feasible strategy for long-term waste management and to provide project-specific funding to implement the strategy. This "projectization" approach should minimize the generation of "orphan" wastes with no identified long-term management alternative. The waste management strategy needs to address the following:

- Identification and quantification of each waste stream
- Segregation and staging
- Short-term storage
- Treatment
- Sampling and packaging to meet waste acceptance criteria
- If appropriate, an existing or proposed (new) contracting mechanism

This is not to say that long-term storage is not allowed. Instead, it obligates the project to identify and fund presently available long-term storage space or to fund and create new long-term storage space for those wastes where no other feasible management alternative is identified.

CERCLA Permit Waivers

CERCLA permit waivers are available to decommissioning activities, to ER activities in the Buffer Zone, and to limited ER activities in the Industrial Area. These waivers can streamline the approval of additional, protective storage capacity specifically designed to address the level of risk associated with the wastes. The basis for the waivers must be included in a submittal to CDPHE and EPA. See Section 3.5.4 for a complete discussion of permit waivers.

In addition, planning is underway to implement a CAMU for temporary waste storage as a contingency if RFETS can not meet the goals of the Site Closure Project Plan (currently called the 2006 Closure Project Baseline). When completed, the CAMU may accept remediation wastes generated from RFCA decommissioning and ER activities. Process wastes that are also hazardous wastes are not within the definition of remediation wastes and although not eligible for management in the CAMU may be co-located with remediation wastes in accordance with RFCA Appendix B. Similarly, some polychlorinated biphenyl (PCB) wastes (e.g., wastes generated from fluorescent light ballasts) will not be eligible for management in the CAMU. A variety of activities at the site involve disturbing and managing soils. Portions of the soil may be contaminated with hazardous or radiological constituents at varying levels. In many instances, management of the soils will be specifically addressed in a decision document or associated technical memoranda. In other situations (e.g., construction not associated with decommissioning or ER) there will be no RFCA decision document to cover the activity. In these situations, the soil should be managed in accordance with Section 3.12 of the IGD.

CERCLA Off-Site Rule

Wastes generated under RFCA/CERCLA authorities are subject to the CERCLA Off-Site Rule. (See RFCA ¶19 and 40 CFR § 300.440). The CERCLA Off-Site Rule requires regulatory approval of any off-site disposal facility prior to disposing wastes generated under CERCLA authority. The rule avoids having wastes from CERCLA-authorized actions contribute to present or future environmental problems by directing these wastes to management units determined to be environmentally sound and having no significant violations or uncontrolled releases. Verifications of CERCLA Off-Site Rule determinations will be accomplished as part of the Kaiser-Hill Team's Off-Site Waste Management program. If a facility does not have CERCLA approval, DOE RFFO will request approval through EPA. DOE RFFO must verify compliance with the Off-Site Rule prior to waste shipment. In addition, the determination of acceptability must be updated and documented periodically (i.e., every 6 months). EPA will make reasonable efforts to assist DOE RFFO with timely Off-Site Rule determinations.

LDR Mixed Wastes

For LDR mixed wastes, treatment will be covered under the appropriate decision documents and will not be added to the RFETS Site Treatment Plan unless The LDR waste would be managed in treatment systems implemented under the Site Treatment Plan, or they were not provided for in a decision document. The applicability of LDR treatment standards and the achievement of LDR compliance for the mixed wastes to which LDR treatment is applicable must be explicitly addressed in the appropriate decision document.

PCB Wastes

Wastes contaminated with PCBs will be generated by activities external to RFCA. Routinely generated, leaking fluorescent light ballasts that contain PCBs are fully regulated under TSCA and must be stored, inspected and disposed in accordance with the TSCA requirements. All PCB-containing ballasts removed during decommissioning of Type 1 buildings are also subject to TSCA regulation. Building types are described in the Decommissioning Program Plan (DPP) Section 3.2. RFETS also has two PCB-containing transformers in service. These transformers remain fully regulated by TSCA (administratively and substantively) unless and until they become subject to a decommissioning decision document.

If a decision document controlling the decommissioning of a Type 2 or Type 3 building specifically includes one or both of the transformers, management of the transformers must then be accomplished in a manner that attains the substantive attributes of the identified ARARs. Likewise, management of PCB light ballasts must also attain substantive ARARs. Full compliance with both substantive and administrative requirements for off-site PCB management is mandated when the PCB wastes are shipped off-site for treatment, storage, or disposal.

2.5.2. Water

Activities conducted pursuant to RFCA will generate water and wastewater that must be managed and, if necessary, treated at the appropriate facilities. In addition, each project may have to incorporate special considerations for stormwater management, spill controls and countermeasures, and other environmental protection measures.

Wastewater Management

Since 1979, RFETS has held a National Pollutant Discharge Elimination System (NPDES) permit regulating the discharge of treated wastewater into off-site waterways. A renewal of the current permit has been prepared, but has not been issued as of July 20, 1998. Generally, the NPDES permit implements the requirements of the Clean Water Act (CWA) and regulates the discharge of the site's wastewater treatment plant, Building 995, the release of

product water from Building 374, and storm water discharges. In addition to establishing the performance standards for Buildings 995 and 374, and limitations on specific parameters in the discharge, the permit also imposes a number of administrative requirements from employee training to pollution prevention and spill control practices described below. Presently, a range of wastewater treatment capability is available at RFETS, but the continued availability of these wastewater treatment capabilities is subject to change. Pursuant to RFCA, an Integrated Water Management Plan (IWMP) (RFETS, 1997) has been developed as a Site-wide document to evaluate short and long-term wastewater treatment needs. (See RFCA ¶119). As a reference source, the IWMP provides a variety of useful background information on RFETS water and wastewater management. The IWMP and updates should be reviewed during project scoping to determine if on-site wastewater treatment capacity is available for project activities.

As closure activities proceed at RFETS, and wastewater treatment capacity is gradually reconfigured or removed from service, each project will have increasing responsibility to provide project-specific water management and wastewater treatment capacity. To expedite any NPDES permitting that may be required, RFCA provides for a consolidated review process. (See RFCA ¶ 101 and ¶103). Depending on project complexity, the consolidated review process represents a commitment by EPA and CDPHE to perform review and public comment on permit applications concurrent with the accelerated action decision process. In addition, the consolidated review process is not supposed to require more time for approval than would otherwise be required under the IM/IRA or PAM process. (See RFCA ¶99).

Spill Prevention Control and Countermeasures/Best Management Practices Plan and Storm Water Pollution Prevention Planning

RFETS is subject to regulatory requirements to have a spill prevention program and to implement best management practices (BMPs) to prevent oil and hazardous substances, respectively, from entering waters of the United States. Under the CWA, a spill prevention plan is required to prevent the release of oil in harmful quantities, which are defined as follows:

For purposes of section 311(b)(4) of the Act, discharges of oil in such quantities that the Administrator has determined may be harmful to the public health or welfare or the environment of the United States include discharges of oil that:

- (a) Violate applicable water quality standards; or*
- (b) Cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.*

BMPs are not specified in regulation, but, rather, rely on professional judgment as to the appropriate measures to take. BMPs that prevent stormwater from coming into contact with hazardous substances and barriers to prevent materials from entering surface waters are commonly employed under these requirements.

Other activities may be subject to the substantive requirements of the regulations as ARARs. In addition, some of the construction activity associated with decommissioning will be subject to select substantive requirements of the General Stormwater Permit for Construction Activities. By virtue of the CERCLA permit waivers (Section 2.6.1), formal notification under that General Permit is not required for decommissioning in the Industrial Area or accelerated actions conducted in the Buffer Zone.

Any construction activity where conditions exist that are different enough that it would be appropriate for an individual permit, may be subject to additional monitoring or substantive requirements not contained in the General Stormwater Permit for Construction Activities. Such conditions could include construction in a location contaminated from past industrial activities or where stormwater from the construction site comes into contact with industrial or process wastes. Such locations would have to be outside the Industrial Area, which is already covered by a stormwater permit. The general permit is designed for use where the primary contamination anticipated is suspended solids mobilized by precipitation. However, water that falls on the site as "stormwater" may remain stormwater. Each proposed construction activity must be evaluated individually, with particular attention to the location's proximity to contamination, the proposed time frame, and the type of construction.

Stormwater and groundwater accumulation may also fall under the Site's procedure for the management of incidental water, Control and Disposition of Incidental Waters (1-C91-EPR-SW.01 Rev. 2). The procedure establishes approved methods for disposing of water accumulated after storm events or as a result of seepage, and provides current information about organizations and points of contact.

2.5.3. National Environmental Policy Act

In accordance with RFCA ¶95 and the June 1994 DOE Secretarial Policy on NEPA, decision documents prepared under RFCA are to incorporate NEPA values. RFCA decision documents that are subject to public and/or agency review before the actions they describe are taken, ordinarily will not require separate RFETS NEPA documentation (e.g., a categorical exclusion or an environmental assessment). Those not subject to public review before action is taken, typically will require NEPA documentation. A draft of all RFCA decision documents must be submitted to the RFETS NEPA group for review to determine if:

- (1) Separate NEPA documentation is required, and
- (2) NEPA values have been adequately incorporated.

To ensure NEPA equivalence, it is also necessary to include a "no action" alternative in the alternatives analysis for all IM/IRAs, PAMs, Decommissioning Operations Plan (DOPs), and RFCA Standard Operating Protocol (RSOPs).

For decommissioning activities, it is expected that NEPA values will be incorporated into the DPP. Any decommissioning not covered by the DPP will be subject to the process described above for decision documents.

After consultation with the stakeholders, or as a matter of policy, DOE RFFO may choose to prepare separate NEPA documentation for an action. If separate NEPA documentation is required, submittal of a project to the RFETS NEPA group for review should be by letter, preferably with a completed environmental checklist. Environmental checklist forms are available from the RFETS NEPA group. NEPA documentation, if required, would be a categorical exclusion or an environmental assessment.

Many projects may be categorically excluded from the NEPA requirements unless there are factors that make a categorical exclusion inappropriate. Such factors include high levels of radiation, other risk factors, or impacts to wetlands, threatened and endangered species habitat, or other environmentally-sensitive areas. Projects that may be categorically excluded must still receive documented approval. If a project is not eligible for a categorical exclusion, an environmental assessment will be required.

2.5.4. Air

RFETS is subject to the Colorado Air Pollution Prevention and Control Act and implementing regulations. An operating permit for RFETS is currently under development by the Colorado Air Pollution Control Division (CAPCD). To expedite any air permitting that may be required, RFCA provides for a consolidated review process (See RFCA ¶101). The consolidated review process represents a commitment by EPA and CDPHE to conduct review and public comment on permit applications concurrent with the accelerated action decision process. In addition, the consolidated review process is not supposed to require more time for approval than would otherwise be required under the IM/IRA or PAM process (See RFCA ¶99).

The type of air permitting required is determined by an evaluation of the activity's potential to emit air pollutants and the site's total emission inventory. In general, activities with potential emissions of less than 1 or 2 tons per year, for the major pollutants, or other various thresholds for hazardous air pollutants are not subject to air permitting. In some cases, a commitment to abide by existing site procedures (e.g., dust control) can be sufficient to ensure that emissions remain below permitting thresholds. At higher levels of emissions, RFETS may be required to submit air permits and Air Pollutant Emission Notices (APENs). APENs are used by CDPHE to inventory emissions for planning purposes and attainment demonstrations. Modification to the RFETS Title V Operating Permit (or permit application) may be required. The regulations require that quantified emission estimates be included in the application.

Umbrella or "bubble" type permits can also be obtained. This type of permit allows RFETS contractors and subcontractors to conduct multiple excavation, clean-up, or demolition operations under a single permit that contains specified limits of annual pollutant emissions, scope definition, and control requirements. Grouping of multiple operations on a single permit is allowed by the CAPCD, provided aggregated sources are related. Once obtained, any project subject to the permit terms and conditions is required to document specified operation parameters to demonstrate compliance. The emission limitations established for bubble permits will allow for multiple projects annually. As long as the total permitted annual emissions are not exceeded and the controls specified in the permit are employed, no additional permitting or public comment is required. Questions and clarifications on air permit requirements should be directed to the RFETS air group.

2.5.5. Ecological Concerns

As a federal natural resource trustee, DOE RFFO (and its contractors) must act in the public interest with regard to conservation of natural resources. As a result of this responsibility, to ensure compliance with applicable regulatory requirements, ecological concerns must be addressed during project planning at RFETS. Compliance with the Endangered Species Act; Fish and Wildlife Coordination Act; Migratory Bird Treaty Act (MBTA); CWA; and the Colorado Nongame, Threatened, and Endangered Species Act is required for RFETS activities. Several DOE policies and orders also mandate protection of ecological resources.

Many wildlife species at RFETS are managed and protected by the State of Colorado. Penalties for violations of state wildlife protection laws can include: fines, compensation for damages, or imprisonment. The U. S. Fish and Wildlife Service administers the Endangered Species Act, the Fish and Wildlife Coordination Act, and the MBTA. These acts provide protection of ecological resources from harm. The regulatory agency with the lead for making decisions related to wildlife issues should be determined during project scoping.

Pursuant to the CWA, both the EPA and the U.S. Army Corps of Engineers (USACE) have jurisdiction over activities that affect RFETS wetlands. Generally, the EPA has jurisdiction over CERCLA activities, and the USACE has jurisdiction over non-CERCLA activities. The EPA reserves the right to make all jurisdictional determinations. If a project will affect wetlands, a mitigation plan must be developed and in place prior to beginning work. In addition to CWA requirements, DOE RFFO is required to protect wetlands under Executive Order 11990. Finally, wetlands impacts must be considered whenever water treatment and operations practices are modified or eliminated.

Prior to the start of work, RFETS activities must be evaluated by a qualified ecologist for potential to impact the Preble's Meadow Jumping Mouse (a resident threatened species), migratory birds, threatened or endangered species and their habitats, and wetlands. Any outdoor work area must be surveyed in accordance with procedures 1-D06-EPR-END.03 (K-H, 1994a) and 1-G98-EPR-END.04 (K-H, 1994b).

If a protected species is found to be present at a work site, work may be delayed until consultation with the U. S. Fish and Wildlife Service has been completed. This is now particularly true if work will be in or may affect riparian areas on the site, because the Preble's Meadow Jumping Mouse, a species that lives in these areas, is listed as a threatened species (63 FR 26517-26530, May 13, 1998).

Other resource protection issues of importance at RFETS include weed control and revegetation. Weed control on federal lands is mandated by the Federal Noxious Weed Act, the Colorado Weed Management Act, and the Jefferson County Undesirable Plant Management Plan. In areas where long-term soil disturbances will occur, or where revegetation will be done, projects must budget appropriate funds to meet weed control needs. Revegetation with native plant species and limitation of the size of a surface disturbance is controlled by DOE Order 6430.1A (DOE, 1989).

The Natural Resources Management Policy (NRMP) establishes natural resource policies for management of the Buffer Zone. It is based on the open space cleanup objective expressed in the RFCA Vision. The NRMP will guide selection and funding of Buffer Zone management activities while the Site is being cleaned up under RFCA.

Consistent with the RFCA Vision, DOE RFFO will manage resources during cleanup to preserve currently available options for Buffer Zone open space use to facilitate post-closure resource management discussions. In addition, the NRMP will establish policies for addressing natural resource damage issues under CERCLA.

2.5.6. Health and Safety

The regulatory authorities for worker health and safety during activities conducted pursuant to RFCA are the Occupational Safety and Health Act (OSHA) requirements found at 29 CFR Parts 1910 and 1926 and DOE Order 440.1 (DOE, 1995h). DOE Order 440.1, entitled "Worker Protection Management", obligates DOE RFFO's contractors to comply with the OSHA 29 CFR Parts 1910 and 1926 requirements. The requirements embodied in the OSHA regulations are addressed in the RFETS Health and Safety Practices manual (K-H, 1997), specifically HSP 21.03.

RFETS has an Integrated Safety Management (ISM) program that is implemented for each work activity. Consistent with the site's ISM program, hazards associated with executing the work are identified and controls are put in place to mitigate the hazards to the performance of any field work.

3. TECHNICAL APPROACH AND PROCEDURES

All remediation work at RFETS will be conducted as an accelerated action for one or more IHSSs or buildings, a closure plan for RCRA regulated units, or pursuant to a CAD/ROD for an Operable Unit (OU) (See RFCA ¶96). Decommissioning will be performed as described in a PAM, IM/IRA (described in the DPP), or as described in individual DOPs for more complex activities. Deactivation, decontamination, and decommissioning will be integrated with ER to ensure efficiency between programs.

To expedite remediation work and maximize accelerated risk reduction, DOE RFFO will make extensive use of accelerated actions for buildings, IHSSs, Potential Areas of Concern (PACs), and Under Building Contamination (UBC). For ease of discussion, "IHSSs," "PACs," and "UBCs" will all be termed as "IHSSs" for the remainder of this document.

The focus of the RFETS ER Program is on cleanup. The decision process will be developed using a bias for action that: (1) identifies IHSSs or evaluates the Site for risk, (2) determines whether a cleanup is necessary, and if so, evaluates whether the IHSS is appropriate for an accelerated action, and (3) ranks the area relative to other IHSSs. The ER process flow is shown in Figure 3-1.

Since 1995, the ER Ranking has been the tool to implement this bias for action by focusing on addressing high-risk sites before low-risk sites, thus more quickly reducing risks to human health and the environment.

In the future an opportunistic approach will evaluate the accessibility of an area and what, if any, potential future impacts exist due to other remedial actions in the area.

During the remediation of the IA, ER representatives will be coordinating with decommissioning representatives as early as possible to understand the building history, remediation schedule, and what IHSS, including PAC and UBC conditions, may exist. Early coordination will increase efficient use of resources. However, any time it is determined that an IHSS is impacting human health or the environment, such that immediate action is warranted, then action will be taken as soon as possible.

Following completion of all accelerated actions, including decommissioning, the residual risks in the Industrial Area and the Buffer Zone will be evaluated. (See Section 3.6.3).

3.1. ENVIRONMENTAL RESTORATION PROCESS AND DOCUMENTS

The IAG (DOE, 1991) created 16 OUs. By the time RFCA was signed in 1996, OUs 11, 15, and 16 had been closed by means of CAD/RODs. Attachment 1 to RFCA and a prior modification to the IAG consolidated the remaining thirteen OUs into seven OUs.

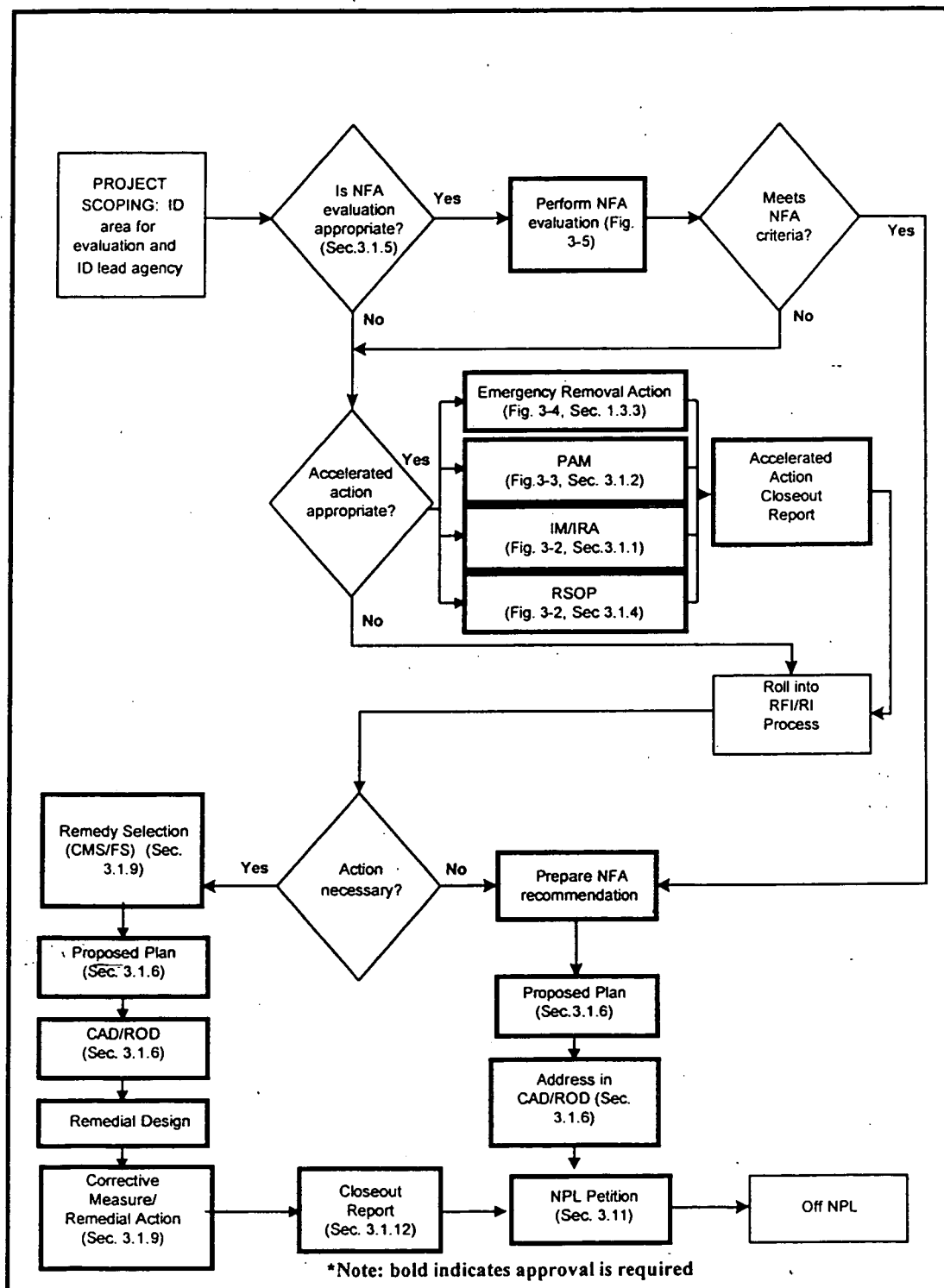


Figure 3-1 Environmental Restoration Process Flow

Development of RFETS-specific documents is described with accompanying flow charts in the following sections. Development of standard CERCLA documents will be in accordance with the NCP and other available EPA guidance documents.

In developing any RFETS decision document, DOE RFFO will meet with the regulators to present the approach to a given remedial action. (See Section 2.0.) Once the approach is agreed upon by all parties, development of the decision document will proceed as outlined below.

RFCA identifies several types of decisions for action or no action:

- IM/IRAs will be developed when a formal evaluation of remedial options is necessary or remedial activities are estimated to require more than six months from commencement of physical work to completion. The requirements for IM/IRAs are discussed in Section 3.1.1 and Appendix B.
- PAMs will be used where remedy selection is straightforward, and remedial activities are estimated to take less than six months from commencement of the physical work to completion. The requirements for PAMs are described in Section 3.1.2 and Appendix C.
- Emergency Removal Actions are discussed in Section 3.1.3.
- No Action and No Further Action decisions for IHSSs will be documented in updates to the Historical Release Report (HRR), as described in Section 3.1.5 and detailed in Attachment 6 to RFCA.
- CAD/RODs have been or will be developed by DOE RFFO for OUs 1, 3, 5, 6, 7, 11, 15, and 16. Future CAD/RODs will be developed to document the final corrective action/remedial decision for the Buffer Zone and the Industrial Area. Development of CAD/RODs will follow EPA guidance. The RFCA approach to CAD/RODs is described in Section 3.1.6.

The RFCA also identifies RSOPs that are applicable to routine ER and/or decommissioning activities that DOE RFFO may repeat without obtaining additional approval. Initial approval of an RSOP will be through the IM/IRA process (See RFCA ¶25b). The requirements for RSOPs are addressed in Section 3.1.4 and Appendix D.

- DOPs for complex decommissioning activities will be reviewed by the LRA via either the PAM or IM/IRA review process. (See RFCA: ¶121).

Supporting documents identified in RFCA that may be required for an IHSS to reach the decision document stage, may include RCRA Facility Investigation/Remedial Investigation (RFI/RI) work plans and reports and Corrective Measure Study/Feasibility Studies (CMS/FSSs), which are part of the CAD/ROD process. Other supporting documents identified in RFCA are Sampling and Analysis Plans (SAPs), Technical Memoranda (TM),

Closeout Reports, and Treatability Study Reports where necessary. The development of SAPs is discussed in Section 3.2 and the development of TMs is discussed in Section 3.1.9.

Appendices to this document are included that discuss the development of RFETS-specific documents. When documents will be developed using the standard CERCLA approach, the EPA guidance for developing these documents is cited.

The document review process is similar for all of the major documents identified in RFCA. Specific document review processes and times are found in Part 9 of RFCA. Generic schedules and suggested document formats are included with the IGD appendices.

During the public comment period, and after consultation with and approval by the LRA, DOE RFFO may initiate certain preliminary activities. These preliminary activities may include conducting appropriate sampling in accordance with the approved SAP and conducting any studies and administrative activities prerequisite to implementing the accelerated action.

If public comments are received, the approved Responsiveness Summary will be placed in public information repositories before the accelerated action is initiated except with regard to the preliminary activities described above. DOE RFFO will keep the LRA apprised of the progress of the activities required for implementation of the accelerated action through the monthly RFCA project coordinators meeting and the quarterly RFCA progress reports. (See RFCA ¶s 262 and 263).

3.1.1. Interim Measure/Interim Remedial Action Decision Documents

IM/IRAs apply to interim remedial activities or removal actions that are estimated to take more than six months from the commencement of physical work to completion. (See RFCA ¶107). Remedial activities performed under an IM/IRA will, to the extent practicable, be consistent with and contribute to the efficient performance of any anticipated long-term remedial action. The IM/IRA may also serve as a RCRA Part B permit modification, when indicated in the document. If CDPHE determines that an activity constitutes a RCRA Class 3 permit modification, the IM/IRA will be subject to the public comment process outlined in RFCA ¶108. The IM/IRA process is shown in Figure 3-2. Section 3.10 describes the process for modifying approved decision documents.

IM/IRAs will also be developed for accelerated actions where several remedial options are available. These IM/IRAs will evaluate multiple alternatives and justification of the selected alternative.

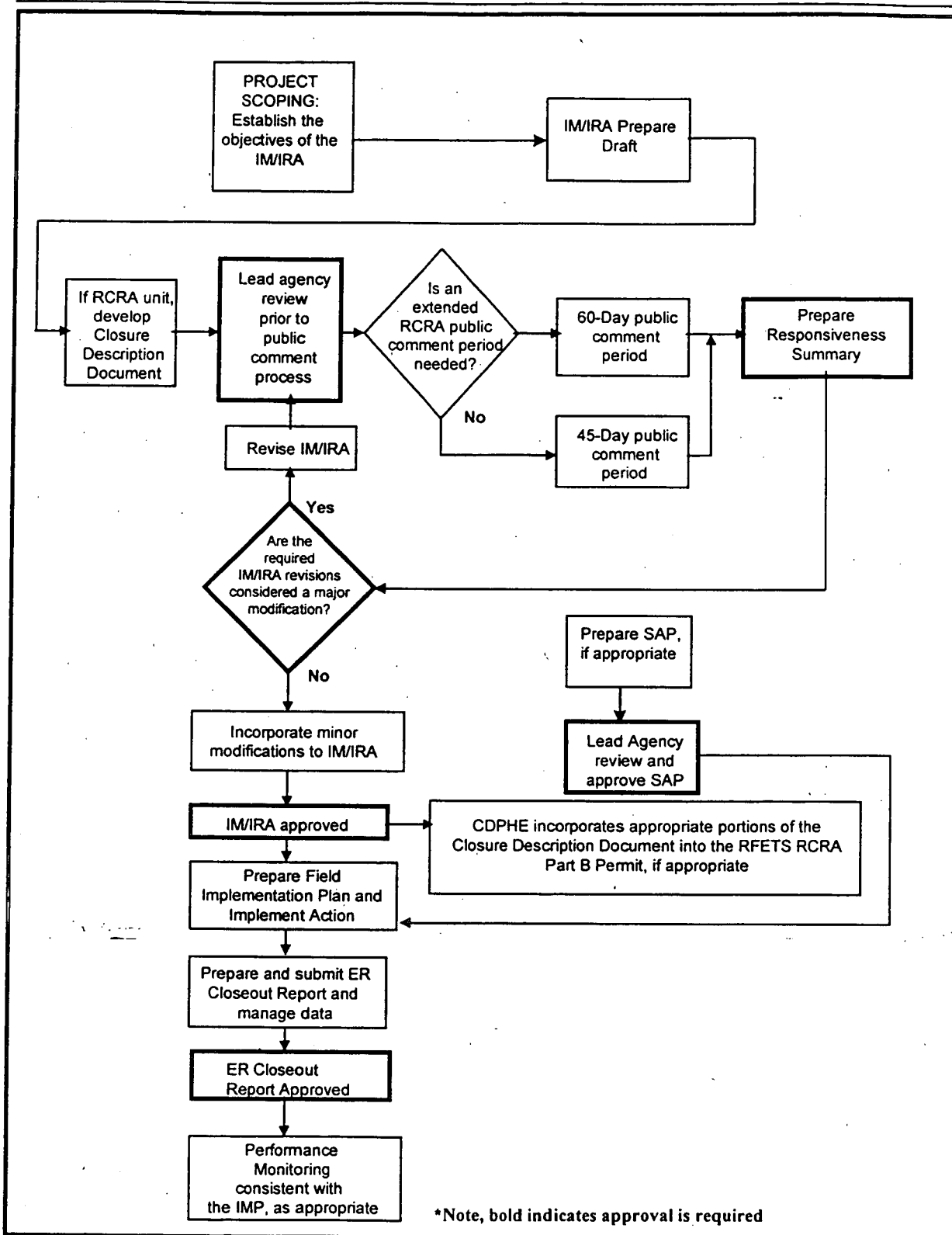


Figure 3-2 Environmental Restoration Interim Measures/Interim Remedial Action (IM/IRA) Process

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The IM/IRA process requires production of three documents: the IM/IRA, the SAP, and the Closeout Report. Public comments are received and a formal responsiveness summary is included with the final IM/IRA. The responsiveness summary may also be prepared as a separate document. The document schedule will be set during Project Scoping consistent with RFCA ¶s 89, 107, and 108.

A SAP (see Section 3.1.8) is prepared concurrently with the IM/IRA and is finalized during the public comment period. Although the SAP is submitted to the agencies for review and approval, it is not reviewed by the public because of the technical detail. Any additional documents necessary to execute the accelerated action should be made available to the agencies and the public, but they are not subject to agency approval or public comment. These documents include the Health and Safety Plan (HASP), the Hazards Analysis (HA), Readiness Analysis, and the Field Implementation Plan (FIP). Although this type of information is vital to performing the action, it is not part of the RFETS authorizing sequence.

IM/IRA format and contents are discussed in Appendix B, Preparation of an IM/IRA. Consistent with RFCA ¶107, an IM/IRA includes:

...[A] brief summary of data for the site, a description of the proposed action, an explanation of how waste management considerations will be addressed, an explanation of how the proposed action relates to any long-term remedial action objectives, proposed performance standards, all ARARs and action levels related to the proposed action; and an implementation schedule and completion date for the proposed action.

Performance monitoring is required for all groundwater remedies and should be noted in the IM/IRA. Details of the performance monitoring will be developed as part of the project-specific remedial decision document and implemented through the IMP described in Section 3.14 (DOE, 1998). Performance monitoring will be required for some soil remedies, and, if appropriate, identified in the IM/IRA. (See Section 3.4.E of the ALF). To meet NEPA requirements, screening of alternatives, including no action, is required and will use the EPA Engineering Evaluation/Cost Assessment (EE/CA) process for streamlined alternatives analysis as guidance. EE/CA guidance is found in EPA *Guidance on Conducting Non-Time Critical Removal Actions Under CERCLA* (EPA, 1993). The schedule for developing an IM/IRA will follow the document review schedule outlined in ¶107 of RFCA (or ¶108, if applicable).

3.1.2. Proposed Action Memorandum

The PAM is the primary planning and implementation document for ER accelerated actions. Actions expected to take less than six months from commencement of construction to completion may be approved under the PAM process. (See RFCA ¶106). Closeout reports

for actions performed under PAMs will have the same requirements and format as for actions performed under IM/IRAs. The purpose of the PAM is to describe the nature of the contamination, the proposed mitigating action, and an implementation schedule. The PAM preparation process is summarized in Figure 3-3. The PAM may also serve as a RCRA Part B permit modification, where indicated.

The PAM process requires completion of three documents: the PAM, the SAP, and the Closeout Report. PAMs are typically brief documents (four to thirty pages in length) and reference existing information, previously published, and available documents detailing earlier field investigations. PAMs for accelerated actions are coordinated closely with EPA and CDPHE to minimize the number and duration of review cycles. If public comments are submitted, a formal responsiveness summary will be included with the final PAM, which is revised as necessary. Section 3.10 describes the process for modifying approved decision documents.

A SAP (see Section 3.1.8) is prepared concurrently with the PAM and finalized during the PAM public comment period. Although the SAP is submitted to the agencies for review and approval, it is not reviewed by the public because of the technical detail. Additional documents necessary to execute the PAM should be made available to the agencies and the public, but they are not subject to agency approval or public comment. These documents include the HASP, the HA, and the FIP. Although this type of information is vital to performing the action, it is not part of the RFETS authorizing sequence.

Details of PAM preparation are found in Appendix C. Consistent with ¶106 of RFCA, a PAM includes:

...[A] brief summary of data for the site; a description of the proposed action; an explanation of how waste management considerations will be addressed; an explanation of how the proposed action relates to any long-term remedial action objectives; proposed performance standards; all ARARs and action levels related to the proposed action; and an implementation schedule and completion date for the proposed action

Performance monitoring is required for all groundwater remedies and should be described in the PAM. Details of the performance monitoring will be developed as part of project-specific remedial decision document and implemented through the IMP described in Section 3.14 (DOE, 1998). Performance monitoring will be required for some soil remedies and, if appropriate, identified in the PAM. (See Section 3.4.E of the ALF).

The schedule for developing a PAM will closely follow the document review schedule outlined in ¶106 of RFCA, and is illustrated in Appendix C.

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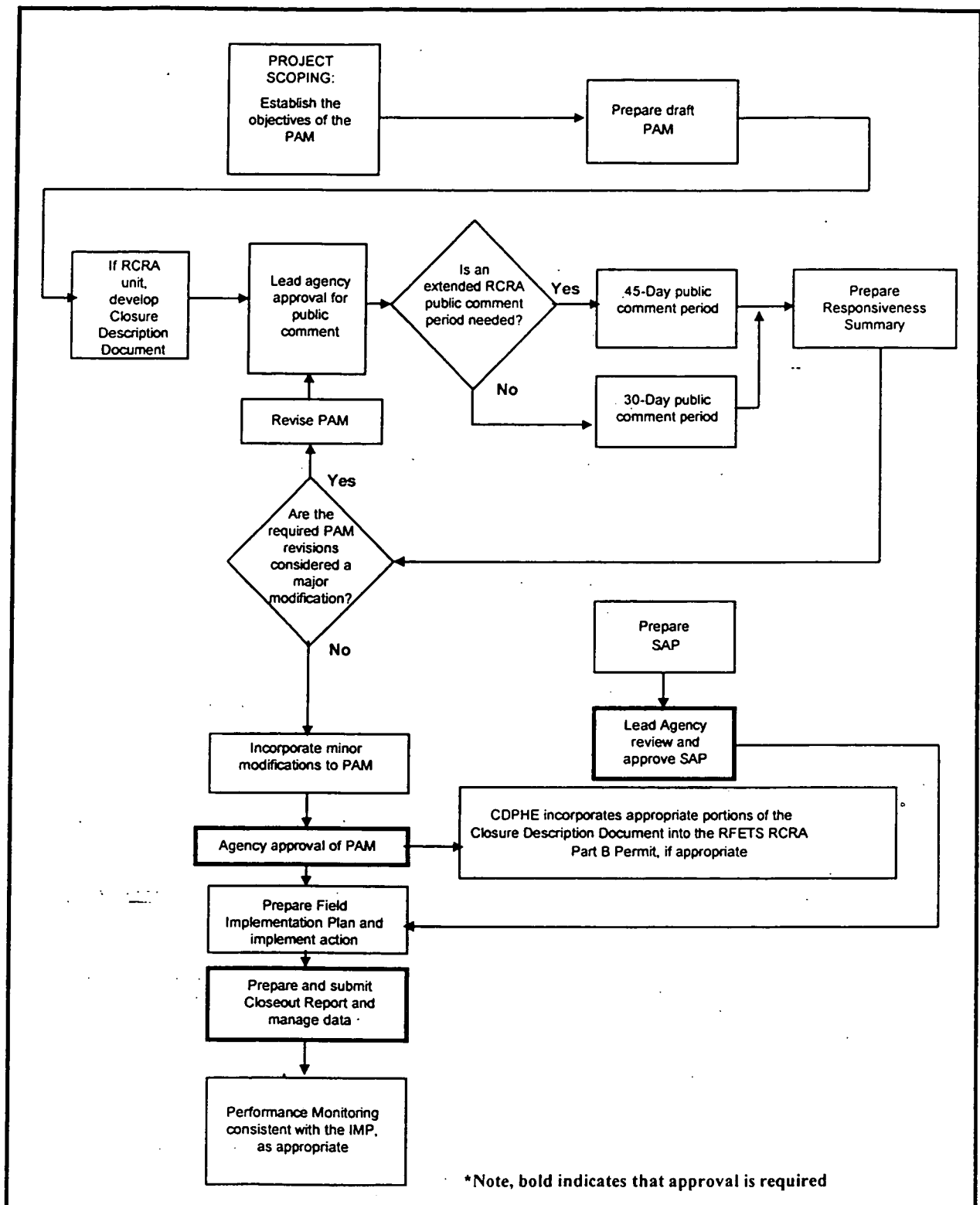


Figure 3-3 Proposed Action Memorandum (PAM) Process

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3.1.3. Emergency Removal Actions

RFCA ¶96 governs Emergency Removals as follows:

DOE may initiate a time-critical removal action if it determines, in accordance with the National Contingency Plan, that an immediate response is needed to eliminate or abate a release or substantial threat of release of a hazardous substance posing an immediate and substantial endangerment to the public health and welfare or the environment. DOE shall notify EPA and CDPHE within 24 hours of this determination. Once the immediate threat has been averted or mitigated, DOE shall propose any further actions that may be necessary in accordance with the provisions of this Part or Part 10, as appropriate.

If the RCRA Contingency Plan is activated, the regulators are notified through that process. Otherwise, the DOE RFCA Project Coordinator will notify the other parties.

The Emergency Removal Action process is depicted in Figure 3-4 and will be documented in a Closeout Report that follows the outline presented in Section 3.1.12. The Closeout Report will assess whether additional evaluation is needed or if sufficient data are available to evaluate for No Action/No Further Action (NFA). The removal action will be incorporated into the annual update of the HRR.

3.1.4. RFCA Standard Operating Protocols

RSOPs:

apply to accelerated actions that are routine and substantially similar in nature, for which standardized procedures can be developed. (See RFCA ¶96).

RSOPs may be developed for remedial actions where the same approach will be applied to several different IHSSs or buildings. An example of an ER RSOP would be a generic plan for cleaning and rendering tanks inert. Review and approval of RSOPs will follow the document review process of IM/IRAs. The public comment period for RSOPs will follow the IM/IRA process. An approved RSOP is implemented by notifying the other RFCA parties. (See RFCA ¶25) RSOP format and contents are discussed in Appendix D, Preparation of an RSOP.

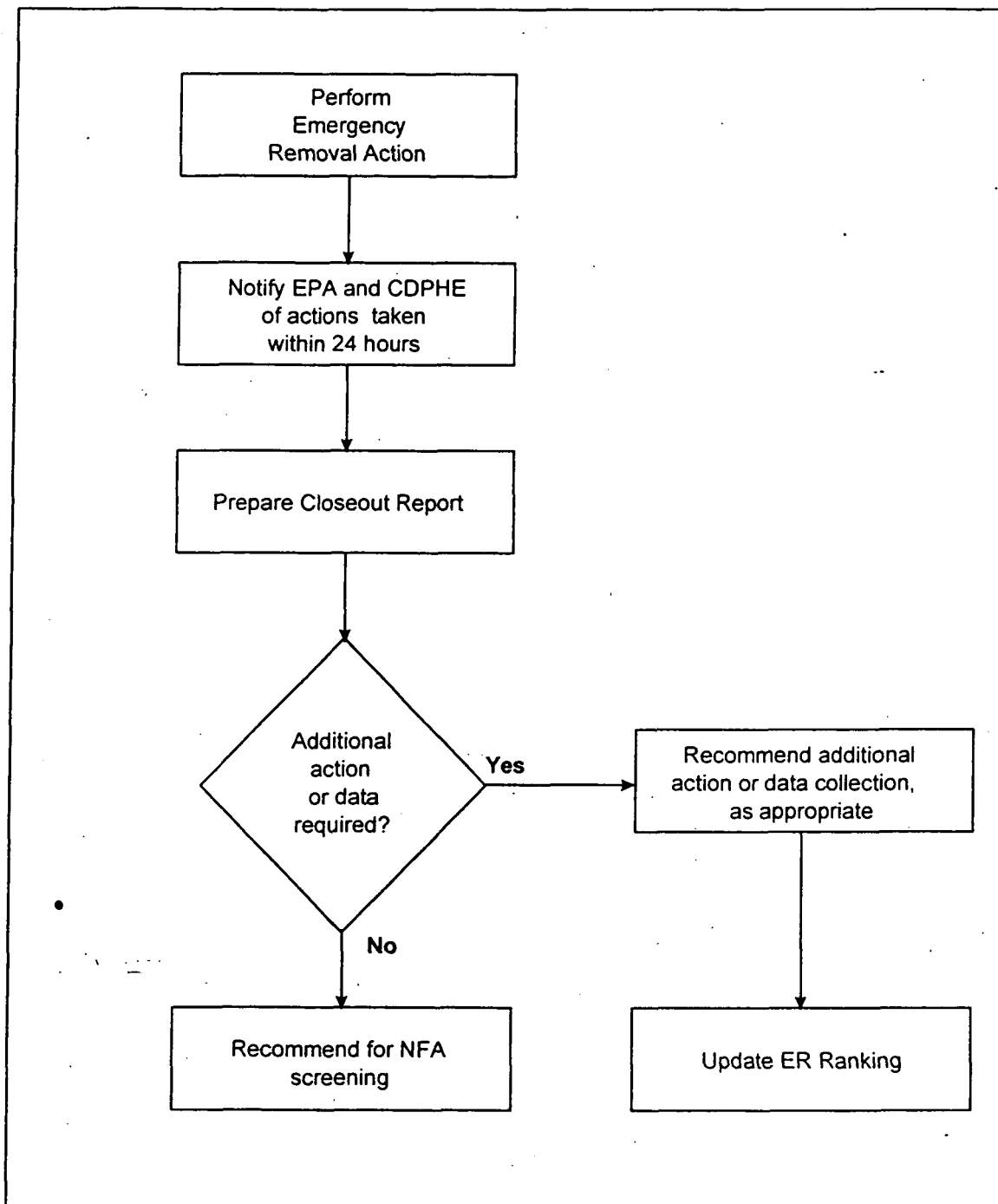


Figure 3-4 Emergency Removal Action

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3.1.5. No Further Action Decisions

The criteria and documentation requirements for determining if a geographic area (IHSS, PAC, UBC, Source Area, OU, or Area of Concern [AOC]) can be recommended for NFA are detailed in RFCA Attachment 6. The NFA decision process presented within RFCA Attachment 6 meets the substantive requirements to support an NFA (as defined by CERCLA) remedy selection for a CAD/ROD. As in Attachment 6, the acronym "NFA" represents all circumstances under which an NFA decision may be warranted at RFETS:

- When the geographic area poses no current or potential threat to human health or the environment (**no action decision**)
- When a previous response eliminated the need for further response or when the ALF in RFCA Attachment 5 indicates institutional controls alone will constitute acceptable risk management (**no further action decision**)

Since RFCA and ALF incorporate institutional controls, an NFA decision will imply the implementation of institutional controls and indicates that institutional controls alone will constitute acceptable risk management. An NFA decision will mean that no (further) treatment or engineering controls are warranted for a specific geographic area, but will allow future monitoring.

RFCA Attachment 6 provides decision criteria for establishing those geographic areas at RFETS not requiring further study or remediation as part of the CERCLA process. This NFA decision process is shown in Figure 3-5 and summarized below.

1. **Conduct source evaluation** – If a review of historical release information/defensible data reveals that no current or potential contaminant source exists, then the exposure pathway is incomplete and the geographic area may be recommended for NFA.
2. **Conduct data evaluation** – If the available data are not of sufficient quality or quantity to evaluate a geographic area by means of the ALF, then additional environmental data must be collected.
3. **Conduct an ALF comparison** – If media-specific environmental data collected from the geographic area are below surface water action levels or Tier II action levels for groundwater or soils, the geographic area may be proposed for NFA.
4. **Determine required actions** – If action levels for any medium are exceeded, remedial or management action or an evaluation is required. If an evaluation demonstrates that no action is required to protect surface water and ecological resources, the area may be proposed for NFA.

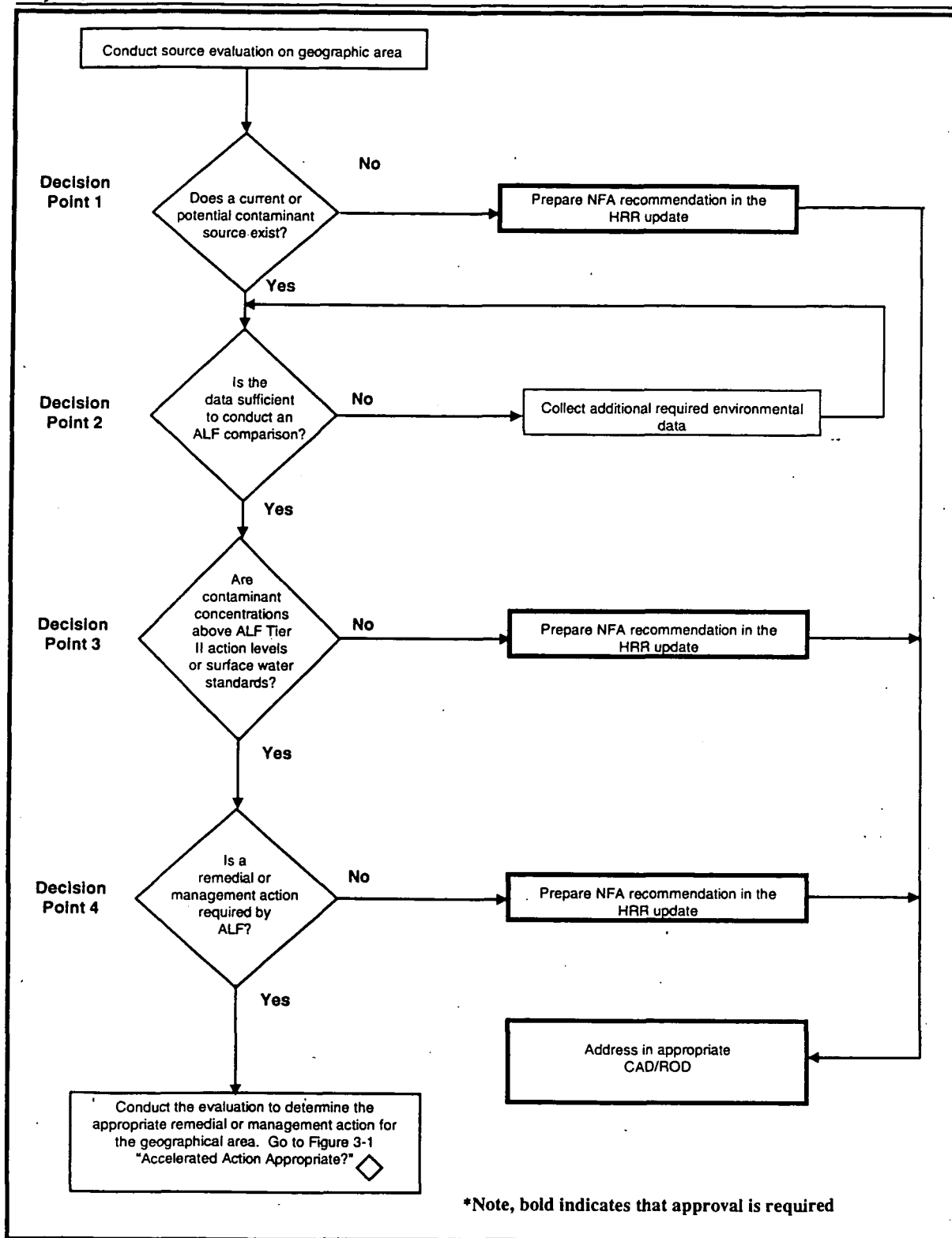


Figure 3-5 Decision Points for No Action or No Further Action Recommendations

In addition to the NFA decision process described above, a risk evaluation may be performed on specific geographic areas to justify NFA. If that risk evaluation is based on a residential exposure scenario (such as the CDPHE conservative screen), a NFA decision without institutional controls may be justified.

The rationale for an NFA decision will be summarized in an update to the HRR, and appropriate supportive documentation will be appended, as necessary. (See Section 3.8.2). Geographic areas documented in this manner will incur minimal administrative attention and costs while awaiting final disposition in a CAD/ROD. This process also removes any impediment the area might otherwise impose on adjacent or overlapping activities. All NFA decisions documented in this manner are subject to review in a CAD/ROD. Other administrative requirements for coordination of NFA decisions with the CAD/ROD process and with RCRA closures at RFETS are discussed in RFCA Attachment 6. A generic schedule for the NFA process is included in Appendix E.

3.1.6. Proposed Plans and Corrective Action Decision/Record of Decision

CAD/RODs apply to the final corrective action/remedial decision made for an OU or a group of OUs following implementation of all accelerated actions. (See RFCA ¶96). CAD/RODs have been or will be completed for OUs 1, 3, 11, 15, and 16. The consultative process provides a mechanism for the Site to consider several options (e.g., single or multiple CAD/RODs) during development of a final CAD/ROD strategy.

Individual IHSSs will be recommended as NFA sites or will be cleaned up through accelerated actions. The residual contaminant levels following accelerated actions will be documented in the various Closeout Reports, the HRR, the RFETS Soil Water Database (See Appendix F) and will be assessed in the CRA. The NFA recommendations and the results of the accelerated actions will support the preparation of the final CAD/ROD(s), regardless of which proposed CAD/ROD strategy option is implemented.

For the Industrial Area OU, CDPHE will make a recommendation to EPA whether to concur with DOE's proposed remedial decision for radionuclides and other hazardous substances that are not hazardous constituents (See RFCA ¶84). This remediation decision will be presented to the public in a Proposed Plan (PP), and finalized in a CAD/ROD. The PP and the CAD/ROD will be developed following the *Interim Final Guidance on Preparing Superfund Decision Documents* (EPA, 1989a).

For the Buffer Zone OU, following implementation of all planned accelerated actions, EPA and DOE RFFO will make a final remedial decision. The Buffer Zone remediation decision will then be presented to the public in a PP and finalized in a CAD/ROD.

Proposed Plan

Preparation of the PP is described in the *Interim Final Guidance on Preparing Superfund Decision Documents (EPA, 1989a)*. If a CAD/ROD is proposed that requires action, the purpose of a PP is to facilitate public participation in the remedy selection process by:

- Identifying the preferred alternative for a remedial action at a site or OU and explaining the reasons for the preference
- Describing other remedial options that were considered in detail in the CMS/FS
- Soliciting public review and comment on all of the alternatives described
- Providing information on how the public can be involved in the remedy selection process

When a NFA CAD/ROD is proposed, the purpose of the PP is to facilitate public participation by:

- Explaining the basis of the no action or no further action alternative
- Describing the accelerated actions taken and the results of those actions
- Soliciting public review and comment on the no action or no further action alternative
- Providing information on how the public can be involved in the final decision to take no action or no further action.

A PP is a public participation document that is expected to be widely read. Therefore, it should be written in a clear and concise manner using non-technical language and should not exceed five to ten pages. In addition, it should direct the public to the RFI/RI and CMS/FS reports, accelerated action closure reports, and other Site-specific information as the primary source of detailed information on the remedial alternatives analyzed.

For the OUs at RFETS, the PP should list the IHSSs that have been addressed through the NFA process that will be included in the CAD/ROD for the OU. A table format is recommended for listing the IHSSs or buildings, how they were closed, and each IHSS or Closeout Report.

A PP should relate the findings of the RFI/RI, CRA, and CMS/FS in a brief, non-technical format. The information should be presented in support of the preferred alternative (including the no action or no further action alternative) and discuss how it is protective of human health and the environment.

A PP should clearly state that the LRA and DOE has identified a preferred alternative based on available information, but they have not "selected" a remedy to implement. A PP supports only preliminary decisions for an OU, and it should not make definitive findings or declarative statements that would be difficult to revise later.

A PP should emphasize that the preferred alternative is only an initial recommendation. It should clearly state changes to or from the preferred alternative may be made, if public comments or additional data indicate that such a change would result in a more appropriate solution. The plan must also state that the final decision will be documented in the CAD/ROD after the DOE RFFO and the LRA have taken into consideration all comments from the SRA and the public.

The EPA guidance on preparing decision documents describes statutory requirements for a PP and suggests language for these sections. The guidance also includes a suggested outline and detailed suggestions for writing a PP, and describes how to address changes to the PP following public comment. A specific appendix on development of a PP is not included in the IGD because RFETS PPs are expected to follow the general process EPA outlined above.

Corrective Action Decision/Record of Decision

The CAD/ROD documents the remedial action plan for an OU. DOE RFFO and the LRA in consultation with the SRA will prepare the CAD/ROD. (See RFCA ¶83, 84, and 85 for discussion of regulatory authority over CAD/RODs). The CAD/ROD has the following purposes:

- To certify that the remedy selection process was carried out in accordance with the requirements of RFCA, CERCLA, and is consistent with the NCP
- To outline the engineering components and remediation goals of the selected remedy
- To provide the public with a consolidated source of information about the history, characteristics, and risks posed by the conditions at the Site, as well as a summary of the cleanup alternatives considered, their evaluation, and the rationale behind the selected remedy

The CAD/ROD consists of three basic components: (1) a Declaration, (2) a Decision Summary, and (3) a Responsiveness Summary.

The Declaration functions as an abstract for the key information contained in the CAD/ROD, and it is signed by the EPA, CDPHE, and DOE. The Decision Summary provides an overview of the Site characteristics, the alternatives evaluated, and the analysis of the remedial options. The Responsiveness Summary addresses public comments submitted on the PP, RFI/RI and CMS/FS report, and other information in the AR.

The Interim Final Guidance for Preparing Superfund Decision Documents (EPA, 1989a) includes a section-by-section discussion of the components of a ROD, and it should be followed in developing a RFETS CAD/ROD. RCRA units can be closed within the CAD/ROD. The EPA guidance also covers preparing a NFA ROD. Rather than repeat this well-developed information the reader is referred to this guidance and to previous RFETS CAD/RODs. Appendix G includes a generic PP/CAD/ROD development schedule.

3.1.7. RCRA Facility Investigation/Remedial Investigation Process

Because remedial actions at RFETS have been combined into a limited number of OUs, only two RFI/RI remain to be conducted. Other OUs have already been investigated under the RFI/RI process and are in various stages of completion. The CERCLA process for RI development will be followed for the Buffer Zone and Industrial Area OUs (EPA, 1988a). A flow diagram of the RFI/RI process, as envisioned for RFETS, is shown in Figure 3-6. When the RFI/RIs for the Buffer Zone and the Industrial Area are developed, all identified IHSSs should have undergone risk screening and should be identified for either an NFA recommendation or accelerated action. The RFETS RFI/RIs will integrate existing data and gather new data only where data gaps related to remediation are identified. Decision-making needs will be linked directly to data collection and will address RFCA requirements for environmental monitoring in accordance with the IMP.

The Industrial Area RFI/RI will be developed following remediation of the Industrial Area. The Industrial Area RFI/RI will focus on developing an Industrial Area conceptual model and the CRA. Areas that have not undergone accelerated action, deactivation, or decommissioning will be evaluated for further data needs. The need for collection of additional data will be determined during project scoping and development of the RFI/RI work plan. If enough data are available to determine the risk from the Industrial Area and further remediation is necessary to address the risk, any additional data collected will focus on selection and design needs.

The Buffer Zone RFI/RI process may not involve the gathering of new data, but will focus on developing the CRA. The CRA will compile the summary information and risk estimates from the previous Buffer Zone BRAs where possible. However, remedial actions, taken after production of the original BRAs, may render many of the estimates obsolete, and new estimates will have to be combined with those from the Industrial Area to determine the cumulative effects on some receptors. If additional action is needed as part of the final remedial action for the Buffer Zone, the remedy will either be selected through the CMS/FS process or a presumptive remedy will be used. The remedy selection will be documented in a PP/CAD/ROD. Appendix H includes a generic RFI/RI process schedule.

3.1.8. Sampling and Analysis Plans and Data Quality Objectives

SAPs will be required in support of pre-remedial characterization, waste volume calculations, waste characterization, verification of cleanup, and design data needs. Data quality objectives (DQOs) will be developed for all sampling activities. Sampling plans and related DQOs will be focused on collecting data to meet a specific need (i.e., to address a specific decision). Decision-making needs will be linked directly to data collection. The purposes of the SAPs include:

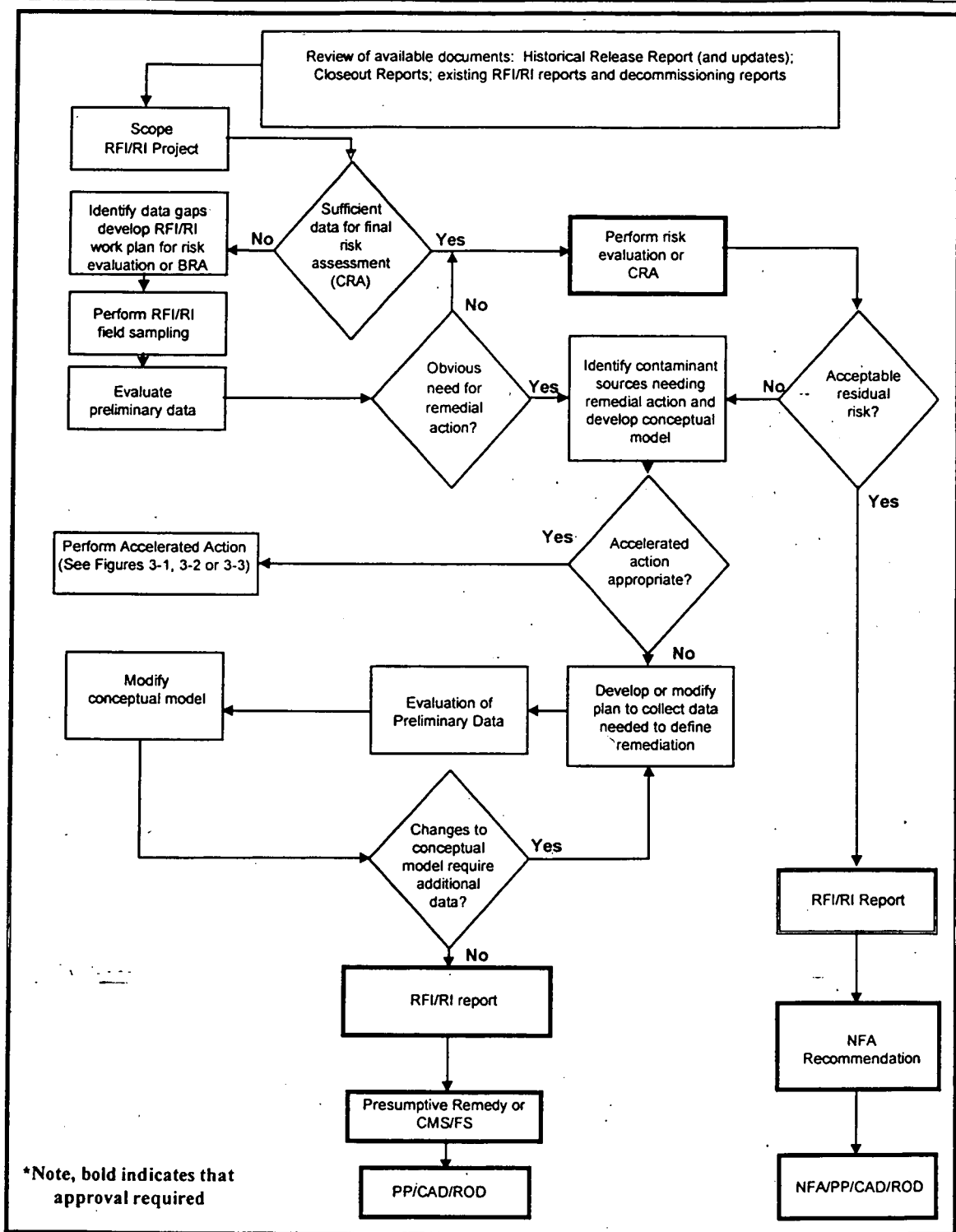


Figure 3-6 RCRA Facility Investigation/Remedial Investigation (RFI/RI)

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- To document the decisions/uses for which data are needed, and the decision process used to determine the specific sampling approach
- To guide the field sampling crew in exactly what samples are to be collected, where and how they are to be collected, and what criteria trigger collection of additional or fewer samples
- The analytical methods to be used and the specific requirements of sample collection and handling for those methods

SAPs consist of a Field Sampling Plan (FSP) and a Quality Assurance Project Plan (QAPjP). At RFETS, a Site-wide QAPjP has been developed. Therefore, most SAPs consist of the FSP and discuss project-specific modifications to the QAPjP. Because of this approach, data quality objectives focused on the project-specific data needs are developed within each SAP/FSP. Development of SAPs is described in Appendix I.

Data quality in terms of laboratory analytical methods will be focused on the primary and secondary data uses. In general, SW-846 analytical methods are appropriate for the documentation of hazardous waste characteristics, for risk evaluation, and for the determination that soils remaining following a cleanup are below the levels specified in the decision document. Radiological laboratory analysis will be performed under RFETS Statement of Work for Analytical Measurements. Field screening data are generally sufficient to meet the DQO needs of gross volume calculations before excavation or for excavation control. A statistical approach will be used, where appropriate, to determine the number of samples necessary to make a specific decision. Data will not be collected unless a specific decision has been identified for the data.

In collecting characterization or design data, a conceptual model of the IHSS, specific release, or system to be addressed will be developed based on existing data and professional judgment. The conceptual model will address contaminant transport issues such as expected presence of dense non-aqueous phase liquids, connection to higher permeability zones, and containment of the contamination by low permeability clays. Development of a conceptual model incorporating available data assists in framing the questions that justify additional data collection.

The IMP includes the sampling requirements for routine monitoring of surface water, air, and ecological resources. This monitoring plan has involved extensive DQO evaluation for samples that are collected on a routine basis. The IMP includes the location of collection points, frequency, method of sampling required, and analytical suites. The IMP also describes reporting requirements and specific triggers to increase sampling frequency or perform additional evaluations.

3.1.9. Corrective Measures Study/Feasibility Study

The CMS/FS identifies and evaluates appropriate corrective measures. "Corrective Measures Study" is a RCRA/CHWA term that is analogous the CERCLA "Feasibility Study." Under RFCA, the CMS and FS may be the same document. (See RFCA ¶25v).

The CMS/FS developed at RFETS will be consistent with the NCP and with EPA feasibility study guidance (EPA, 1998a). The EPA proposed rule for Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities (55 FR 30798) and associated guidance will also be considered. Where appropriate, the CMS/FS will evaluate CHWA's closure and post-closure care requirements. A sample table of contents for the CMS/FS and schedule are provided in Appendix J.

The CMS/FS tasks include:

- Establish narrative corrective/remedial action objectives and, if appropriate, numeric remedial action goals
- Develop General Response Actions (GRAs) and identify potential remedial technologies and process options
- Screen potential remedial technologies and process options and develop a list of representative process options (RPOs)
- Assemble RPOs into remedial alternatives
- Screen remedial alternatives to eliminate unfeasible and impracticable options
- Further define alternatives as necessary
- Analyze alternatives against the nine evaluation criteria, then against each other
- Prepare the CMS/FS report to document results

The above list of tasks is adapted from EPA's *Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA* (EPA, 1988a). At RFETS, the primary use of the CMS/FS process will be to evaluate the combined results of various accelerated actions. In that instance, based upon risk assessment and ARARs evaluations, the CMS/FS may result in narrative remedial action objectives and numeric remedial action goals that do not compel evaluation of a wide range of remedial technologies and process options.

The scope and content of the CMS/FS is not subject to an arbitrary formula. The evaluation of technologies and process options, and subsequent screening and analysis is focused on the risk and ARARs-based remedial action objectives.

3.1.10. Technical Memoranda

TMs will be written, if necessary, to resolve specific interpretive issues. They will be brief, similar in nature to a "white paper," and will be focused on presentation and discussion of

information relevant to the specific issue. Many TMs will be developed to address or clarify issues, and will not be subject to the document review and revision process. When the TM modifies a previous decision document, the modifications must be accomplished consistent with Part 10 of RFCA and Section 3.10 of the IGD. The RFCA specifically identifies three types of TMs:

- BRA TM
- CMS/FS TM
- RFI/RI Work Description TM

Examples of other types of TMs would be: impact evaluations of exceedances of action levels, the examination of design data needs, an evaluation of the actual impact of an ARAR on an action, or compilation and discussion of data to determine whether a constituent above an ARAR or a RFCA ALF cleanup level is within natural background variability for the Site. TMs will be incorporated into the AR.

3.1.11 RCRA Closure

RFCA Attachment 10 provides direction on closure of RCRA interim status units. This guidance can also be applied to permitted units; however, these are not covered by the agreement. Four significant RCRA closure issues are included in RFCA:

- Closure of permitted and interim status units incorporated into a decision document in lieu of a unit-specific closure plan
- Closure of land-based and non-land-based RCRA interim status units
- Clean closure of RCRA units
- Phased closure of RCRA units

Hazardous waste management units are subject to closure under the RCRA Part B Permit or the Interim Status Closure Plan. According to RFCA ¶97, CDPHE will determine if a separate closure plan is required or if the closure/post-closure requirements will be incorporated into a decision document. Closure of land-based interim-status units will be incorporated in IM/IRAs; non-land-based interim-status units may be covered by a PAM, an IM/IRA, or an RSOP. RCRA units not closed under accelerated actions or decommissioning will be closed as part of the final CAD/ROD (e.g., 750 and 904 pads).

All closures will be performed in accordance with the CPB. Wastes generated during a closure action, wastes from a corrective action for a land-based unit or residual wastes from a non-land-based unit, are considered remediation wastes. Existing contamination will be addressed separately, as part of RCRA corrective actions/CERCLA remedial actions as determined by the ALF and detailed in the *Groundwater Conceptual Plan for the Rocky Flats Environmental Technology Site* (RMRS, 1996b).

Section I of RFCA Attachment 10 enumerates the minimum requirements for closure of land-based interim-status units (the Solar Ponds and Present Landfill). This section specifies design criteria of a cap/cover over these land-based units, as well as monitoring and other post-closure activities.

Minimum closure requirements for non-land-based units (mostly former OU 9 IHSSs) are discussed in RFCA Attachment 10, Section II. This section specifies the removal of all wastes from these units and describes how the units can accomplish clean closure via corrective action based on an appropriate decision document. If a unit cannot achieve clean closure, other requirements, including post-closure requirements, will apply.

The RCRA Part B Permit (CDPHE, 1997) parallels RFCA ¶71 by specifically providing for phased closure when appropriate. Phased closure begins when a unit is placed in a "RCRA-stable" configuration. The RCRA-stable concept is not described in or regulated by RFCA, but it is included in Section E of Part X of RFETS's RCRA Part B permit. This strategy for clean closure allows DOE RFFO to conduct the closure of a permitted unit in two stages: first by rendering a unit/portion of a unit RCRA stable, followed by completion of the final stage of closure as part of a RFCA-regulated cleanup activity. Once a permitted unit is placed in a RCRA-stable configuration, final closure of the unit is deferred until it is scheduled pursuant to the RFCA budget planning process and prioritized and integrated with other activities. RCRA-stable units will be indicated as such, pending final closure, in the Master List of RCRA Hazardous Waste Units at Rocky Flats, which is updated semi-annually. Elements of this closure strategy include waste removal, elimination of future waste input, less stringent unit management practices (e.g., inspection requirements), and removal of the unit including disposition of associated equipment and debris.

3.1.12. Closeout Reports

A Closeout Report will be prepared for all remedial or accelerated actions, including decommissioning remedial actions, when work and relevant final characterization is completed. The Closeout Report will consist of a brief description of the work that was completed, including: (1) any modifications to the original decision document; (2) final sampling and analysis report(s); (3) a description of the quantity, characteristics, storage and disposal of the remediation and process waste produced; and (4) a statement, if true, that there were no releases to the environment due to the execution of the project or, if not true, a description of the release and the response taken.

The Closeout Report will state whether, as of the date of the Closeout Report, the goals and objectives of the action were met, and, if not, what additional work is required. The complexity of the Closeout Report and the level of detail will reflect the scope and duration of the action. An example outline for a Closeout Report is shown below (only topics germane to the action are required to be included in the report):

- Introduction
- Action description
- Verification that action goals were met
- Verification of treatment process
- Radiological analysis
- Demolition survey results
- Waste stream disposition
- Deviations from the decision document
- Description of site condition at the end of decommissioning (e.g., slab, basement, etc.)
- Site reclamation
- Demarcation of excavation
- Demarcation of wastes left in place
- Dates and duration of specific activities (approximate)
- Final disposition of wastes (actual or anticipated)
- Next steps for the area (e.g., decommissioning is complete; facility demolished or ready for reuse; interim monitoring, if required; or ER action in progress or further evaluation required)

An ER closeout report will be prepared for all ER projects and will be submitted to the agencies. A decommissioning Closeout Report will be prepared for all building decommissioning projects. Only the decommissioning Closeout Reports for Types 2 and 3 (See Section 3.2) building decommissioning projects will be submitted to the agencies. The DPP requires that upon completion of the relevant final characterization (final status survey), DOE RFFO will notify CDPHE, EPA and the public in writing of the completion of decommissioning for a building or group of buildings. DOE RFFO will accomplish notification to the public with a letter to the Rocky Flats Citizen Advisory Board (RFCAB) with a copy of the Closeout Report transmittal letter, which is provided to the appropriate agencies.³

3.1.13. Project Cost Summary

Following project completion, DOE RFFO will provide the following "unburdened" general project costs to the agencies:

- Total project "burdened" and "unburdened" costs
- Project management
- Planning and site preparation
- Excavation and site restoration
- Treatment
- Transportation
- Waste disposal

The Project Cost Summary must be reviewed by K-H Legal prior to its release to the agencies to ensure the information is submitted in a manner to protect confidentiality.

3.2. DECONTAMINATION AND DECOMMISSIONING

The Decommissioning Program is governed by the DPP which describes how aspects of building decontamination and decommissioning will be implemented and elaborates on Attachment 9 of RFCA. The process described in the DPP begins with a scoping meeting, proceeds to reconnaissance level survey for contamination, a hazard assessment, and a reconnaissance level characterization report of the findings. At that point, the lead regulatory agency is notified of the categorization for concurrence. Figure 3.4.1 of the DPP provides an illustration of the process.

The DPP identifies three categories of buildings. Each category of building is subject to progressively more rigorous levels of regulatory scrutiny.

- Type 1 buildings are free of contamination.
- Type 2 buildings are "without significant contamination or hazards but in need of decontamination".
- Type 3 buildings have significant contamination and/or hazards. Buildings 371/374, 559, 707, 771/774, 776/777, and 779 have been designated as Type 3.

For Type 1 buildings, following the reconnaissance level survey, buildings determined to be free of contamination may go directly to reuse, dismantlement, or demolition. For Type 2 and Type 3 buildings the appropriate decision document must be prepared. Buildings may be reclassified from Type 1 to Type 2 if contamination is discovered and the removal techniques will involve a threat of release. Suggested outlines for the decommissioning decision documents are provided in the DPP.

Other documents may also provide useful guidance for completing decommissioning at RFETS. The Facility Disposition Program Manual provides broad information to facilitate projects. In addition, decommissioning characterization protocols have been developed and will assist in conducting reconnaissance level characterization, in-process characterization, and final status surveys.

3.3. INTEGRATION OF DECONTAMINATION AND DECOMMISSIONING AND ENVIRONMENTAL RESTORATION

Prior to the initiation of decommissioning activities, monitoring efforts (monitoring for surface water, groundwater, and air) are required to establish the baseline conditions that exist in the Industrial Area. This effort is coordinated with the RFETS ER and

Environmental Systems and Stewardships Organizations. To establish good baseline conditions, this effort should occur very early in the decommissioning scoping phase and to the extent practicable, be incorporated into the IMP update.

The ER organization will be integrated into decommissioning project scoping to develop an understanding of the project, such as type of contaminants expected in the building; to decide whether adequate monitoring is in place to establish the baseline conditions; and to decide what part of the structure, if any, will be left at the end of decommissioning.

One mechanism used to accomplish ER and D&D integration is the IMP. This plan is a comprehensive consensus-based monitoring plan that incorporates the current thinking of DOE and its contractors, the agencies and the stakeholders. It is intended to capture the required environmental monitoring needed to demonstrate environmental compliance during ongoing operations and closure activities. More recently, the plan has been revised to begin focussing on elements that provide necessary closure documentation. For example, the latest revision to the IMP will be addressing the use of more accurate analytical methods to determine background concentrations of uranium in the groundwater. Discussions have also begun to find ways to incorporate "generic" language that captures the decision rules and data requirements for characterization of soils and building rubble that may remain in the environment at the Site past closure.

3.4. DATA MANAGEMENT AND QUALITY ASSURANCE/QUALITY CONTROL

3.4.1 Data Management

A variety of data will be generated during remediation and ER decommissioning. These data include but are not limited to:

- Air monitoring data
- Meteorological data
- Ecological data
- Surface water monitoring data (including physical and chemical information)
- Groundwater monitoring data (including analytical and field parameters)
- Well construction data
- Geological characterization data
- Spatial data
- Waste characterization data
- Field screening data
- Soils data (analytical and physical data)
- Other characterization data (including high purity germanium [HPGe] field data)

As shown in Figure 3-7, RFCA project managers are responsible for defining their data needs and managing their data to produce current decision documents and the final CAD/ROD. The RFETS Closure Support Group will provide analytical data of known quality, deliver the data to customers, and store the data in REFTS electronic data systems for current and future use. The data collected during all cleanup activities are essential to the successful closure of the RFETS and development of the final CAD/ROD. Therefore, proper management of the data is a key responsibility of the project. In addition, RFETS is required to provide copies of electronic environmental data collected as part of the RFCA process to the agencies (CDPHE and EPA). Therefore, lack of appropriate management may impact the Site's ability to meet RFCA requirements. Appendix F provides details on closure data management requirements.

3.4.2 Data Quality

The RFCA project manager must ensure that environmental data collected in support of RFCA activities meet all applicable data quality requirements (Appendix F), including:

- Analytical data quality requirements
- Program data quality requirements, and
- Evaluation of the data with respect to precision, accuracy, representativeness, completeness, and comparability (PARCC). Details on the analytical data quality assessment process and PARCC analysis are provided in Appendix F.

Quality Assurance/Quality Control (QA/QC) requirements are addressed in a graded approach in accordance with DOE Order 5700.6C (DOE, 1996e) for non-nuclear facilities, activities and services and with the NCP (40 CFR Part 300). Specifically 40 CFR §300.415 (b)(4)(ii) for CERCLA removal actions and 40 CFR §300.430(b)(8) for CERCLA remedial actions require FSPs, SAPs, PAMs, IM/IRAs, RSOPs and Closeout Reports to address quality concerns. Additional details on QA/QC are provided in Appendices F and I.

3.5. ARARS AND RFCA PERMIT WAIVER

RFCA requires a process be developed for identifying applicable or relevant and appropriate legal requirements for response actions under CERCLA. (See RFCA ¶10p). To accomplish this objective, an RFETS Master List of Potential ARARs (ARARs List) for actions that will be taken on-Site is included in the IGD Appendix K. ARARs identification will be initiated when individual projects are scoped, and ARARs will be determined when the decision document is approved. Interpretation of ARARs during a response action will be accomplished using the consultative process. Documentation of ARARs that could not be met during an accelerated action should be documented in the Closeout Report Section (3.1.12). Final ARARs for the Site will be documented in the appropriate CAD/ROD.

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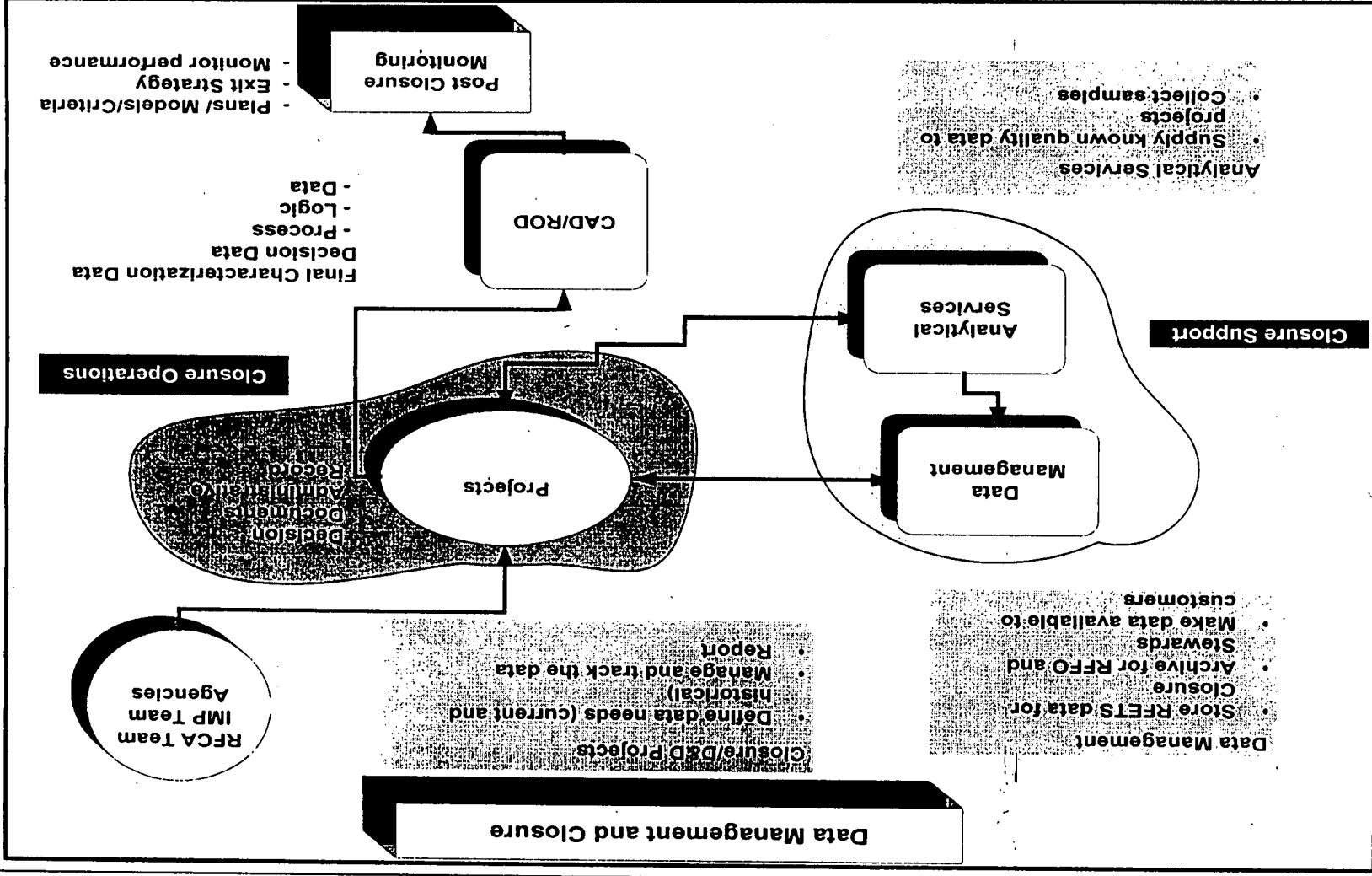


Figure 3-7 Environmental Data Management and Closure

3.5.1. ARARs List

The ARARs List (Appendix K) serves to narrow the universe of potential ARARs. Environmental requirements with little or no likelihood of applicability or relevance and appropriateness (e.g., Coastal Zone Management) have been removed from consideration. The ARARs List will be updated as needed, and at a minimum on an annual basis. (See RFCA ¶5).

3.5.2. Project-Specific ARARs Analysis

ARARs will be initially identified when projects are first scoped. The identification will be conducted consistent with the NCP, the preambles to the proposed and final NCP, CERCLA Compliance with Other Laws Manuals Part I and Part II (EPA, 1988b and EPA, 1989b), and other EPA ARARs guidance.

The identification will begin by evaluating the ARARs List for applicability or relevance and appropriateness. Once the ARARs are narrowed, the final presentation and determination will occur in conjunction with approval of the decision document. ARARs interpretations during actions will be accomplished using the consultative process. Where documentation is warranted, TMs will be prepared.

3.5.3. Exemption from Administrative Requirements of ARARs

CERCLA and RFCA require compliance with substantive, not administrative, ARARs. (See 40 CFR §300.5, definition of *Relevant and Appropriate Requirements*). EPA recognizes that, in some circumstances, the distinction between administrative and substantive requirements is not clear. To address this, EPA described the problem and factors to consider as follow:

In most cases, the classification of a particular requirement as substantive or administrative will be clear, but some requirements may fall into a gray area between the provisions related primarily to program administration and those concerned primarily with environmental and human health goals. Several factors may be considered when it is not readily apparent whether a requirement is substantive or administrative; for example, the basic purpose of the requirement, any adverse effect on the ability of the actions to protect human health and the environment if the requirement were not met, the existence of other requirements (e.g. CERCLA procedures) at the site that would provide functionally equivalent compliance, and classification of similar or identical requirements as substantive or administrative in other situations. The determination of whether a requirement is substantive or administrative need not be documented.

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(See preamble to the proposed NCP, 53 FR 51443, middle column, center).

3.5.4. RFCA Permit Waiver

RFCA ¶16 provides a waiver from permitting for response activities conducted entirely on the Site. The response activities eligible for the permit waiver include:

- Removal or remedial actions in the Buffer Zone
- Decommissioning activities
- Activities under any concurrence CAD/ROD
- Remedial actions in the Industrial Area for hazardous substances that are not also hazardous wastes or hazardous constituents (e.g., radionuclides that are not mixed wastes and PCBs)

In order to receive a permit waiver, DOE RFFO must include in the decision document:

- An identification of each permit that will be exempt
- An identification of the standards, requirements, criteria, or limitations that would have had to have been met to obtain the permit
- An explanation of how the response action proposed will meet the standards, requirements, criteria, or limitations otherwise required by the permit

3.6. RISK EVALUATION

The evaluation of human health and ecological risk is central to the implementation of RFCA. ¶B2a of the RFCA preamble states that controlling the sources of contamination will be the priority of the ER Program. Unacceptable risk will be reduced by remediation or management actions. Risk reduction is best achieved through the risk assessment process.

Under the authority of CERCLA, the EPA has developed guidelines for the evaluation of human health and ecological risks and hazards (EPA, 1994b). Site-specific guidance and parameters to be used in risk evaluations have been negotiated with DOE, EPA, and CDPHE (DOE 1995b, 1995d, 1995e, Appendix L). The Site-specific guidance and parameters have been used and approved in a series of OU-specific BRAs (DOE 1995f, 1995g, 1996c, 1996d). This section documents agreed upon risk methods and parameters, and the points at which they may be applied in the risk management process defined by RFCA and the ALF.

The ALF defines action levels as "numeric levels that when exceeded, trigger an evaluation, remedial action, and/or management action". Since action levels are derived from risk calculations (or, in the case of radionuclides, dose calculations which are within risk limits), comparisons to action levels constitute a risk evaluation. Management decisions and remedial actions should be based on a detailed knowledge of the risks to human health and

the environment. The Site-specific Human Health Risk Assessment Methodology (HHRAM) (DOE, 1995b) coupled with the Ecological Risk Assessment Methodology (ERAM) (DOE 1996a, 1996b) provide the necessary tools. These methodologies are discussed in more detail in Appendix L.

3.6.1. Implementation of Risk Assessment Methodologies Within the RFCA Framework

When an action level for surface soil or subsurface soil is exceeded using single data point comparisons to action levels, the AOC is placed in the ER Ranking System and risk management options are evaluated. The sequence to be followed for action level comparisons is detailed in Section 3.7. Once it is determined that an action level is exceeded, further risk evaluation may be needed depending upon the complexity of the site under consideration.

Action levels for non-radiological chemicals are predominantly risk-based, except for organics in subsurface soils, which are calculated to be protective of surface water standards via groundwater transport. Action levels for radionuclides in groundwater and surface water are risk-based. Action levels for radionuclides in soils are dose-based. In accordance with ALF, chemical risk is considered to be additive when multiple chemicals are present, and radiological dose is additive when multiple radionuclides are present. The method for applying action levels when multiple contaminants are present is explained in Section 3.7.

The project manager must be sure decisions are made using cumulative risk when multiple contaminants are present at a site. After aggregated data are compared to action levels (see Section 3.7), a simple screening level risk assessment, using appropriate receptors and exposure factors, may be used to ensure remedial action decisions have a firm risk-based component. A situation in which a risk screen would be appropriate would be when the results of the action level comparison are very close to breakpoints.

To perform the screening level assessment, the AOC is chosen and the data are aggregated by the methods agreed to for the site-specific HHRAM. The potential contaminants of concern (COCs) can be chosen using a simplified background comparison (see Appendix L), and the exposure concentration calculated using the 95 percent upper confidence limit (UCL95) on the arithmetic mean concentration of contaminants within the AOC. If the estimated risks are below 1×10^{-6} and the hazard index less than one, the AOC may be recommended for NFA. If the risk is greater than or near 1×10^{-4} , an accelerated action may be necessary. If the risk between 1×10^{-6} and 1×10^{-4} , then a more detailed risk evaluation is warranted to ensure that an appropriate risk management decision is made. This detailed evaluation may be deferred to the CRA rather than generating multiple risk evaluations. Results of the screening level risk assessment should be reported in a condensed format (e.g., a letter report or TM).

3.6.2. Environmental Restoration Ranking

ER projects are prioritized based on an approved methodology for producing a risk-based ranking authorized in RFCA ¶74 (See Section 3.7 and Appendix L). Areas may also be added to the ranking as information from action level comparisons or risk assessments become available.

3.6.3. Comprehensive Risk Assessment

Part 8 of the RFCA states that after all accelerated actions have been completed, Site conditions, including residual risk from accelerated actions, will be evaluated and corrective/remedial action decisions will be rendered as appropriate. The preamble to the NCP discusses risk in the remedy selection process in 40 CFR 300.430(e). The preamble at 55 FR 8712 states, "*EPA selects remedies resulting in cumulative risks that fall within a range of 10^{-4} to 10^{-6} .*" OSWER Directive 9355.0-30 (EPA, 1991) more specifically states that, "*(f)or sites where the cumulative site risk to an individual based on reasonable maximum exposure for both current and future land use is less than 10^{-4} , action is generally not warranted....*" These statements are consistent with the agencies' position that a CRA must be completed, including an evaluation of the contribution of all sources of risks and hazards to off-site receptors, before a final CAD/ROD for the Industrial Area and Buffer Zone can be accepted.

The protectiveness of the final remedy to human health and the environment must be measured by evaluating the cumulative risk for the entire Site. The CRA is the mechanism that can provide the answers needed for closure of the Site. The two alternative approaches that could be chosen for performance of the CRA are outlined below.

1. The CRA may be undertaken concurrent with remediation activities in the Buffer Zone and the Industrial Area. Performed in this manner, the CRA would be a living document and updated as remediation progresses. It would be used for directing resources toward remediation targets to reduce the cumulative risk to an acceptable level. The CRA would be a management tool to expedite closure and reduce unnecessary remedial activities.
2. The CRA could be performed after all building disposition, waste removal, and remediation have taken place. Performed in this manner, the CRA would only be used for the final CAD/ROD to ensure no cumulative residual risks from RFETS to human health or the environment.

The methodology for performing the RFETS Site-wide risk assessment has not been finalized. It has not been determined if the CRA will be completed as two modules, one for the Buffer Zone and one for the Industrial Area, or if it will be performed for the entire Site at one time. If a modular approach is used, care must be taken that the modules can be combined for the final estimates of risk to appropriate on-site receptors, environmental hazard, and for modeling of effects to groundwater, surface water, and off-site receptors. The

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RFETS HHRAM will be used as the starting point for developing an appropriate methodology for the CRA. The exposure scenarios and factors previously agreed upon will also be used. The RFCA parties must decide the procedure for data aggregation and determination of how AOCs will be combined for evaluation.

3.6.4. Radiological Dose Evaluations

Radiological dose evaluations of residual radioactive materials are required to ensure protection of public health under DOE Order 5400.5 (DOE, 1990) and to implement DOE's "as low as reasonably achievable" (ALARA) policy. DOE RFFO, EPA and CDPHE have agreed to use EPA's draft *Radiation Site Cleanup Regulations* (EPA, 1996c) for calculation of radionuclide action levels in soils. To be consistent with the RFCA and the ALF, all dose calculations will be done using RESRAD, the computer code the Argonne National Laboratory developed for DOE RFFO to facilitate the implementation of residual radioactive materials guidelines, and Site-specific exposure scenarios, exposure factors, and environmental parameters. A detailed explanation of the derivation of radionuclide action levels for soils is provided in the Action Levels for Radionuclides in Soils (Appendix M).

3.6.5. Cumulative Effects between Dose and Risk

Action levels for non-radionuclide chemicals are risk-based, and chemical risk is considered additive when multiple chemicals are present. Radionuclide action levels are dose-based and radiation dose is considered additive when multiple radionuclides are present. Radionuclides and non-radionuclides will be assessed independently on a project-specific basis using methodology that is protective of human health and the environment. The RFCA Parties will consult regarding whether it is appropriate to assess the cumulative effects of radionuclides and non-radionuclide chemicals on a project-specific basis if the chemical risk and radiation doses are near their respective Tier I action levels.

3.7. THE ACTION LEVELS AND STANDARDS FRAMEWORK

3.7.1. ALF Background

The goals of the ALF are to:

- Provide a basis for future decision making
- Define the common expectations for all parties
- Incorporate land and water use control into Site cleanup

The purpose of the action level is to:

- Trigger an evaluation, remedial action, or management action
- Serve as interim cleanup levels, when appropriate
- Provide "put-back" levels for interim soil removals

As defined in the ALF:

Action levels are numeric levels that, when exceeded, trigger an evaluation, remedial action, and/or management action. Final cleanup levels will be determined in the CAD/ROD. For interim remedial actions, interim cleanup levels will equal Tier 1 action levels unless some other ALF provision requires a greater level of cleanup (e.g., protection of surface water)... A standard is an enforceable narrative and/or numeric restriction established by regulation and applied so as to protect one or more existing or potential future uses. Within this framework, standards are associated with surface water use classifications and applied at points of compliance (POCs). Standards are not being directly applied to groundwater or soils.

The surface water standards are based on promulgated state surface water quality standards below the terminal ponds and are applied as action levels above the terminal ponds. The action levels for groundwater are based on the maximum contaminant levels (MCLs). For those chemical constituents without MCLs or standards, groundwater action levels are based on programmatic preliminary remediation goals (PPRGs). PPRGs are chemical-specific and medium-specific risk-based concentrations calculated for an exposure scenario (e.g., office worker, open space recreational user) using Site-specific exposure factors, standard toxicity factors, and a carcinogenic risk level of 1×10^{-6} , or a hazard index of 1 for non-carcinogenic compounds (See Appendix N for PPRG Tables).

The action levels for surface soils were developed to be protective of human exposure under the designated land use conditions. The PPRGs are used as action levels for all non-radionuclide chemicals. Action levels for radionuclides in surface soil are based on the 15/85 mrem per year dose limits, consistent with EPA's draft Radiation Site Cleanup Regulations, and DOE's proposed 10 CFR 834 (58 FR 16268).

Subsurface soil action levels for many organics were developed to be protective of groundwater using the EPA Soil Screening Guidance (EPA, 1996a, 1996b). For metals, radionuclides and other inorganics, the subsurface soil samples were set equal to surface soil action levels.

3.7.2. Application of the Action Levels to Trigger Interim Actions

Surface Water and Groundwater Monitoring

The application of the ALF to surface water and groundwater monitoring is described in detail in the IMP. The application of ALF to the groundwater portion of the IMP is shown in

Figure 3-8.

Appendix O provides a "process description" as the approach to integrate the goals and objectives of groundwater monitoring, hydrogeologic characterization, and remedial actions at RFETS. The intent of this "process description" is not to prescribe specific analyses that must be performed, but to present a general approach that defines how groundwater contamination at RFETS will be assessed and addressed. By developing an integrated process, the basis for decisions regarding the need for remediation and the evaluation of remediation performance should be consistent, and will effectively protect surface water and ecological resources.

The IMP is developed using the inputs of DOE RFFO and its contractors, the agencies, and the stakeholders, working together to reach consensus regarding the monitoring needs of all parties, both for regulatory purposes and for purposes of assuring appropriate execution of closure activities.

The IMP describes the routine Site-wide monitoring programs for surface water, groundwater, air, and ecology. Sampling locations, frequency, analyte suites, and reporting requirements are provided for each media. The IMP implements additional sampling if Tier II groundwater action levels are exceeded or if surface water action levels/standards are exceeded at POCs. These activities may be in the form of source investigations, requiring expended sampling of water, sediments and soils, or other interim measures such as soil stabilization to ascertain the effects of controls on large disperse contaminated areas whose impact on surface water is not well understood.

For those constituents for which background levels exceed the groundwater action levels, the defacto action level is the background mean plus two standard deviations. In that instance, more frequent sampling and remediation will not be triggered by exceeding the action level. Examples under discussion are uranium (all isotopes) and manganese. Background values are being developed using available data.

Soil

The application of soil action levels to trigger interim actions requires a multi-step approach that includes: soil data value comparison; determination of the AOC; aggregation of the data and comparison to the action levels, evaluation of options including additional characterization (as needed); and selection of management options. An overview of evaluation options available after the initial single data point comparison is shown in Figure 3-9, and summarized below.

Step 1: Soil Data Value Comparison

Compare single soil data values to soil action levels to determine:

- Tier I exceedance

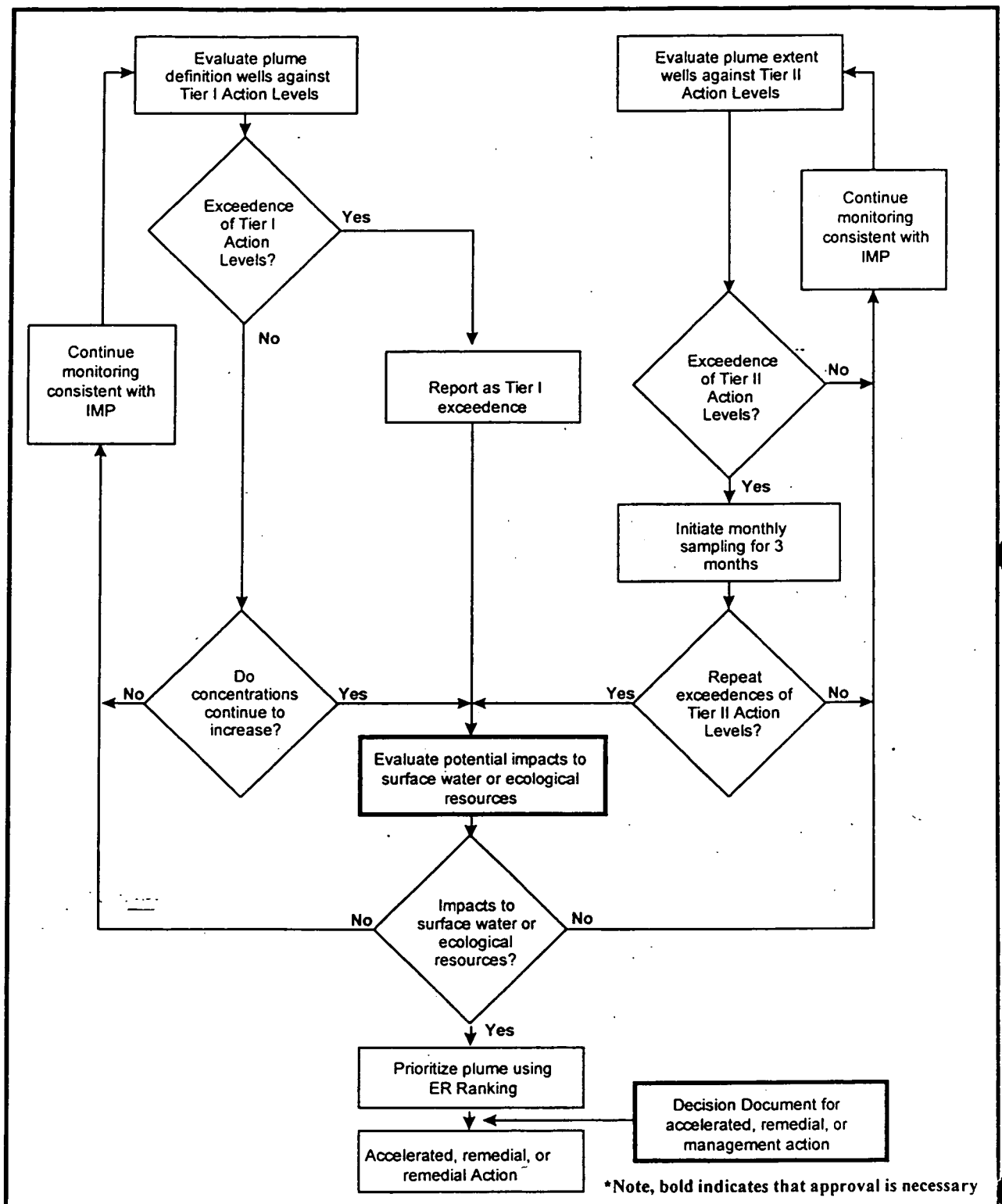


Figure 3-8 Application of Groundwater Action Levels Through the Integrated Monitoring Plan

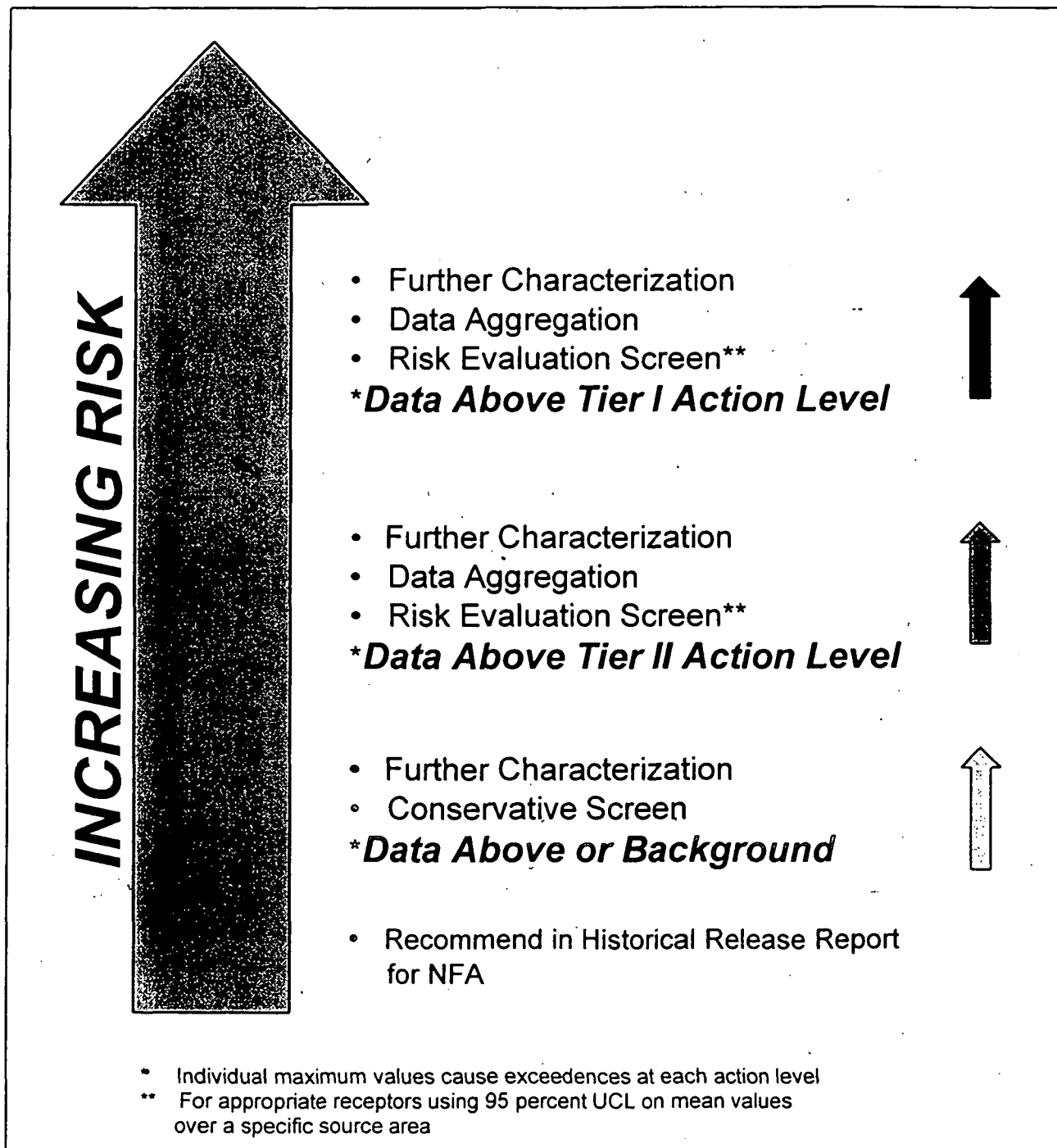


Figure 3-9 Evaluation Options After Data Point Comparison

- The ratio of each soil data value to the Tier I action level is > 1 , or
- The sum of the ratios for either non-radionuclides or radionuclides is > 1
- Tier II exceedance
 - The ratio of each soil data value to the Tier II action level is > 1 , or
 - The sum of the ratios for either non-radionuclides or radionuclides is > 1
- Below Tier II and above background or conservative screen
 - The ratio of each soil data value to the Tier II action level is < 1 , or
 - The sum of the ratios for either non-radionuclides or radionuclides is < 1

Step 2: Data Aggregation

The spacial extent of contamination must be known for a remedial action to be planned and undertaken. The AOC is determined for this purpose. When an evaluation of a Tier I exceedance shows an area of very limited extent (e.g., a "hot spot"), data aggregation may not be appropriate, and an action may be performed. The AOC is determined and the data aggregated as follows:

- Determine AOC with respect to action levels using comparison to:
 - background mean plus 2 standard deviations for inorganics
 - detection limits for organics
 - AOCs will be established based on the spacial data distribution
 - There is no lower limit on the size of an AOC, but no single AOC will exceed 10 acres
- Average data over the AOC, as appropriate
- Use the UCL95 of the mean for comparison to the appropriate action level

Step 3: Evaluation Options

Other evaluation options shown in Figure 3-9 include further characterization or a more detailed risk analysis. If the amount of data available for an AOC is limited, then further characterization may be required. If the result of the action level screen, after data aggregation, is near the breakpoint of, then a more detailed risk assessment may be performed to better define the appropriate action. If the results of the action level comparison are below Tier II, then it may be appropriate to apply the CDPHE conservative screen or another risk evaluation to allow a NFA decision that does not require institutional controls (Section 3.1.5).

Step 4: Management Options

Various management options are available for AOCs depending on the outcome of the

action level evaluation and the media. These are detailed in RFCA Attachment 5. (A general discussion is presented in RFCA Attachment 5, Section 1.3, and action determinations for subsurface and surface soils are detailed in Section 4.3 and in Section 5.3, respectively.)

3.7.3. Performance Objectives

As stated in RFCA, Attachment 5, interim cleanup levels for interim remedial actions will equal Tier I action levels unless a provision of ALF, such as protection of surface water, requires a lower remediation goal. Each project will define its specific remediation goals in the appropriate decision document.

3.8. ANNUAL REVIEWS AND UPDATES

3.8.1. Annual Updates of the Environmental Restoration Ranking

In accordance with RFCA Attachment 4, the ER Ranking will be updated annually, or more frequently if significant new information or updated action levels become available. If no cleanup or investigation activities occur within a fiscal year, the ranking will not be updated that year. With the consensus of all parties, the priority of any ER site can be changed before updating the list, if additional information indicates that this is required.

The original ER Ranking methodology was refined for the 1996 report to make it compatible with RFCA and ALF. Appendix P presents the general methodology for ranking ER sites including media-specific evaluations and chemical score tabulation. The methodology produces a prioritized list of ER sites, and includes both a list of sites that require more information and a list of sites awaiting final disposition.

The ER Ranking will no longer be the sole source for identifying the remedial action sequence. The RFCA Parties recognize that future remedial actions will be addressed based on opportunity and D&D schedules. This opportunistic approach will evaluate the accessibility of an area and what, if any, potential future impacts exist due to other remedial actions in the area. The opportunistic approach will be balanced against the ER Ranking; any time it is determined that an IHSS is impacting human health or the environment, such that immediate action is warranted, then action will be taken as soon as possible.

3.8.2. Annual Updates for the Historical Release Report

The HRR is required by CERCLA §103(c) to describe the known, suspected or likely releases of hazardous substances from RFETS. Original authorization for the HRR was provided in Section I.B.5 of the IAG (DOE, 1991). The HRR, which was published in June 1992,

provided a complete listing of all known spills, releases, and/or incidents involving hazardous substances that had occurred since the inception of RFETS. Section I.B.3 of the IAG established the requirement for DOE RFFO to notify EPA and CDPHE of any newly-identified or suspected releases or threats of release at RFETS, which may threaten human health or the environment. HRR updates were initially required every three months; however, all three parties to the IAG have agreed that DOE RFFO can submit HRR updates annually. The first annual HRR update report was delivered on August 30, 1996.

The process for updating the HRR has been developed through negotiations and document reviews by DOE, EPA, and CDPHE. As shown in the example presented in Appendix Q, the document format includes: a description of the release event; complete physical and chemical descriptions of the constituents released; validated analytical data; responses to the event; fate of the constituents released; action/no action recommendations; comments; and a reference section. If the HRR update entry serves as a NFA recommendation, it should also state the category of NFA being proposed and should specify which criteria from RFCA Attachment 6 justify NFA. Because NFA recommendations based on ALF comparisons require institutional controls, this condition should be started in the HRR entry.

Among other purposes, the HRR updates serve as a basis for approving soil disturbance permits, as an aid in making waste determinations, as an aid in deciding the appropriate level of personal protection equipment for work in an IHSS; tracking IHSS status (e.g., boundary changes); and communicating IHSS information (e.g., analytical information for waste determinations required by EPA and CDPHE). RFCA Attachment 6, No Action/No Further Action Decision Criteria for RFETS, expands the scope of the HRR updates to include information on geographic areas for which a NFA recommendation is warranted.

The NFA decisions recommended in the HRR updates are intended to be "place keepers." An IHSS can be placed on hold until an OU-wide administrative process (PP, CAD/ROD, RCRA Permit Modification, etc.) is initiated.

3.8.3. RFCA Annual Review

RFCA ¶5 states that:

The Parties shall conduct an annual review of all applicable new and revised statutes and regulations and written policy and guidance to determine if an amendment pursuant to Part 19 (Amendment of Agreement) is necessary.

The RFCA Annual Review is completed by July 19 each year by reviewing Attachment 5 and the following major environmental laws, and associated regulations, written policy, and guidance:

- CERCLA

- RCRA
- TSCA
- CWA
- Clean Air Act (CAA)
- NEPA
 - Ecology (e.g., Endangered Species Act)
- Radiation
- Radioactive Waste
- Defense Authorization Acts and Appropriation Acts

Questions which should be addressed for each area during the review are:

- Are there any new or revised statutes, regulations, written policy, or guidance
- Has the regulatory change been implemented at the Site
- Does the regulatory change need to be implemented
- Does the regulation change impact RFCA and is an amendment required

The annual review prescribed in RFCA paragraph 5 is sometimes referred to as the "Regulatory Review." In addition to the annual review prescribed in RFCA paragraph 5, the RFCA Parties committed to conducting an internal annual review of the radionuclide soil action levels (RSALS). Questions to be addressed on an annual basis include:

- Is there new scientific information available that would impact the interim action levels
- Has a national soil action level been promulgated within the year? If yes, the parties commit to revisit RFETS interim action levels
- How were the interim action levels applied to the Site over the course of the year
- Have the remedies been effective

For more details, see the Responsiveness Summary for Soil Action Levels released on November 6, 1996.

While not required by RFCA, the RFCA Project Coordinators invite the public to submit any new information relevant to the RFCA or RSALS for these reviews during a 30-day comment period. A public meeting by the RFCA Project coordinators will be held if requested. The results of the annual regulatory review and the annual RSAL review are combined and documented in a RFCA Annual Review report which is completed by the end of August.

In addition to the regulatory annual review and the RSAL annual review, RFCA requires the following items also be reviewed on an annual basis:

- IMP (§267)
- Rocky Flats Sitewide Integrated Public Involvement Plan (RFSIPIP)

- (¶ 281 (g))
- ER Ranking (¶ 79)
- AR (¶ 284)
- Milestones (¶ 147)
- Target Activities (¶ 136)
- Summary Level Baseline (¶141)
- ALF (¶ 5)
- HRR (¶119(1))

An annual review commitment is discussed in the IWMP and the IGD.

For more details on the annual review past processes, see the 1998 RFCA Regulatory/RSAL Annual Review Report.

3.8.4. RFCA Biennial Review

RFCA ¶257 states that:

The parties shall assess the implementation of the Agreement every two years with the first assessment being conducted no later than the second anniversary date of the execution of this Agreement. In this assessment, the parties shall conduct a review of the substantive and procedural requirements for this Agreement, including but not limited to the regulatory approach set forth in Part 8, to determine what measures each Party will take to ensure effective implementation of this Agreement. Such measures may include reallocation of resources, internal reorganization, revised procedures for consultation or internal coordination, and additional training of appropriate staff.

The RFCA Biennial Review will be completed by the second anniversary date of the execution of RFCA (by July 19, 1998) and every two years thereafter. The Biennial review is accomplished by establishing a RFCA Party assessment team charged with evaluating the progress at the Site during the past two years. The assessment team may conduct interviews and/or file and document reviews of parties responsible for the implementation and progress of RFCA and parties who were involved with the initial negotiations of the agreement.

For more details on the biennial review past processes, see the 1998 RFCA Biennial Review Assessment Report.

3.9. DISPUTES

Part 15 of the RFCA enumerates procedures for dispute resolution. RFCA directs the parties to attempt first to resolve disputes informally. Where the dispute cannot be informally

resolved, the RFCA directs the parties to raise the disputed issue quickly. The types of disputes identified in the RFCA include:

- Disapproval of a proposed final document (RFCA ¶s 115, 188)
- Denial or partial grant of a change requested for a regulatory milestone (RFCA ¶s169, 188)
- Stop work orders (RFCA ¶s176, 188)
- Force majeure (RFCA ¶175)
- Permit waivers (RFCA ¶16)
- Proposed permit modifications (RFCA ¶s22, 188)
- Accelerated Actions (RFCA ¶69)
- Decommissioning (RFCA ¶69)
- Determinations that conditions or activities constitute a release or threat of release (RFCA ¶69)
- CAMU (RFCA ¶82)
- Additional work required under CERCLA (RFCA ¶200)
- RFCA interpretation or implementation (RFCA ¶189)
- Amendments to RFCA (RFCA ¶190)
- IMP (RFCA ¶188)
- Imposition of fees by CDPHE (RFCA ¶188)

The RFCA also identifies five classes of disputes and specifies the procedures for each. The five classes of disputes include:

- Decisions by lead regulatory agencies
- Disputes regarding additional work required under CERCLA
- Disputes regarding budget and work planning
- EPA-State disputes regarding site-wide issues
- Disputes regarding overall direction of proposed work

More specifics may be included in the future based on the results of the RFCA Biennial review concerning timing of disputes and recognizing issues as a dispute.

3.9.1. Disputes Regarding Decisions By Lead Regulatory Agencies

The RFCA creates two organizations to perform dispute resolution. The Dispute Resolution Committee (DRC) consists of the following individuals:

- CDPHE – Hazardous Waste and Materials Management Division Director
- DOE – Assistant Manager for Environmental Compliance, RFFO
- EPA – Region VIII Assistant Regional Administrator for Ecosystems Protection and Remediation

The DRC is the first level of formal dispute resolution. The second level of dispute resolution is the Senior Executive Committee (SEC). The SEC consists of the following individuals:

- CDPHE – Director, Office of Environment
- EPA – Assistant Regional Administrator
- DOE – Manager, RFFO

The SEC receives disputes that the DRC has unanimously elevated without resolution or disputes that the DRC has resolved but are under appeal. A schematic of the process is provided in Figure 3-10.

3.9.2. Disputes Regarding Additional Work Required Under CERCLA

Disputes regarding additional work required under CERCLA follow the basic procedures outlined in Figure 3-10. Authority to review appeals of SEC decisions is controlled by RFCA ¶69.

3.9.3. Disputes Regarding Budget and Work Planning

DOE disputes regarding budget and work planning employ the procedures diagrammed in Figure 3-11.

3.9.4. EPA-State Disputes Regarding Site-wide Issues

For purposes of EPA-State disputes regarding Site-wide issues, the State-EPA Dispute Resolution Committee (SEDRC) and the State-EPA Senior Executive Committee (SESEC) have the same composition as the DRC and SEC except the DOE does not vote on those committees. The RFCA identifies the following as Site-wide issues:

- PP/draft permit modifications
- CADs/RODs
- Updates to the ER Ranking
- Updates to the IGD
- Future RSOPs for activities regulated under this agreement that are related to more than one OU

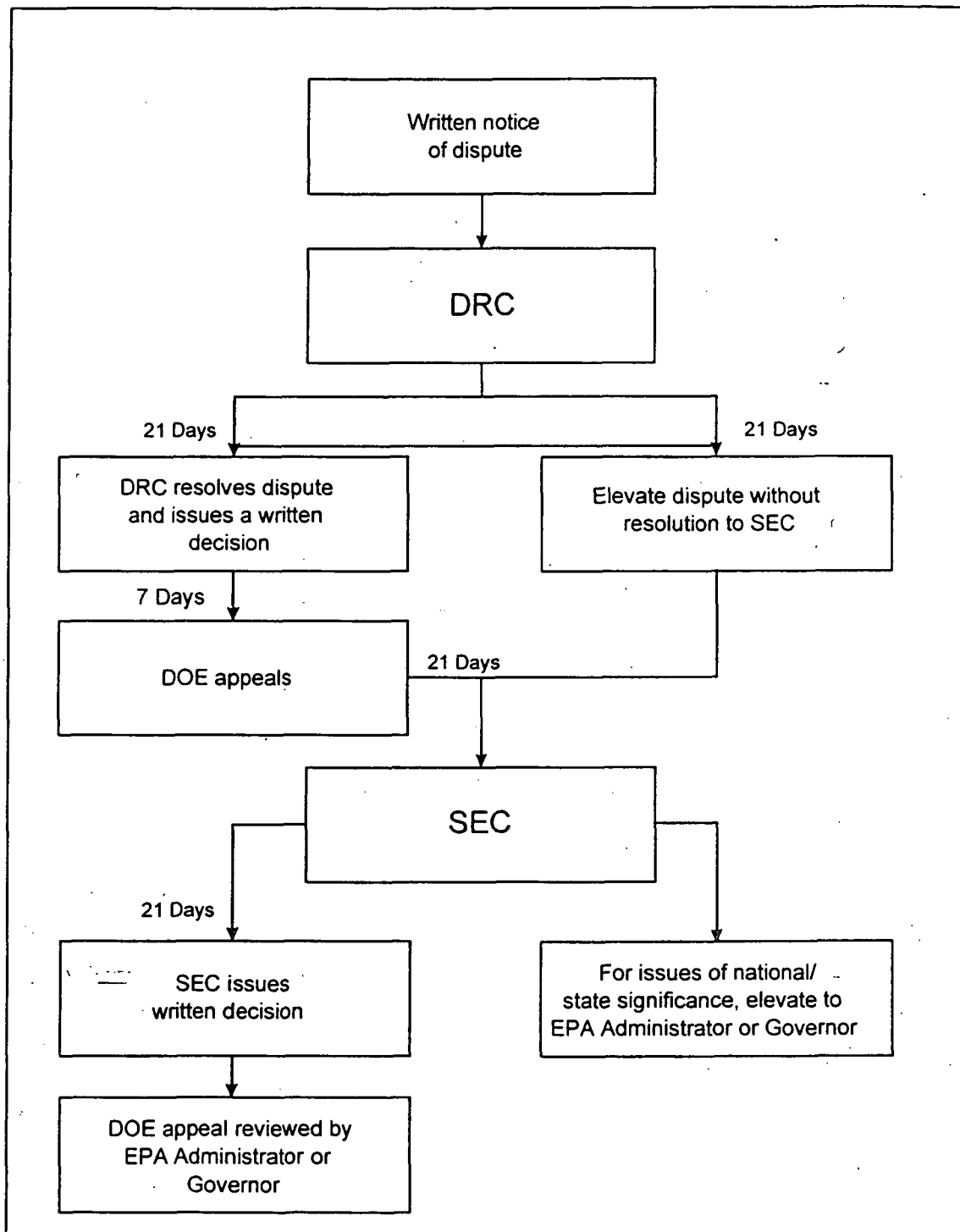


Figure 3-10 Process for Disputes Regarding Decisions by the Lead Regulatory Agency

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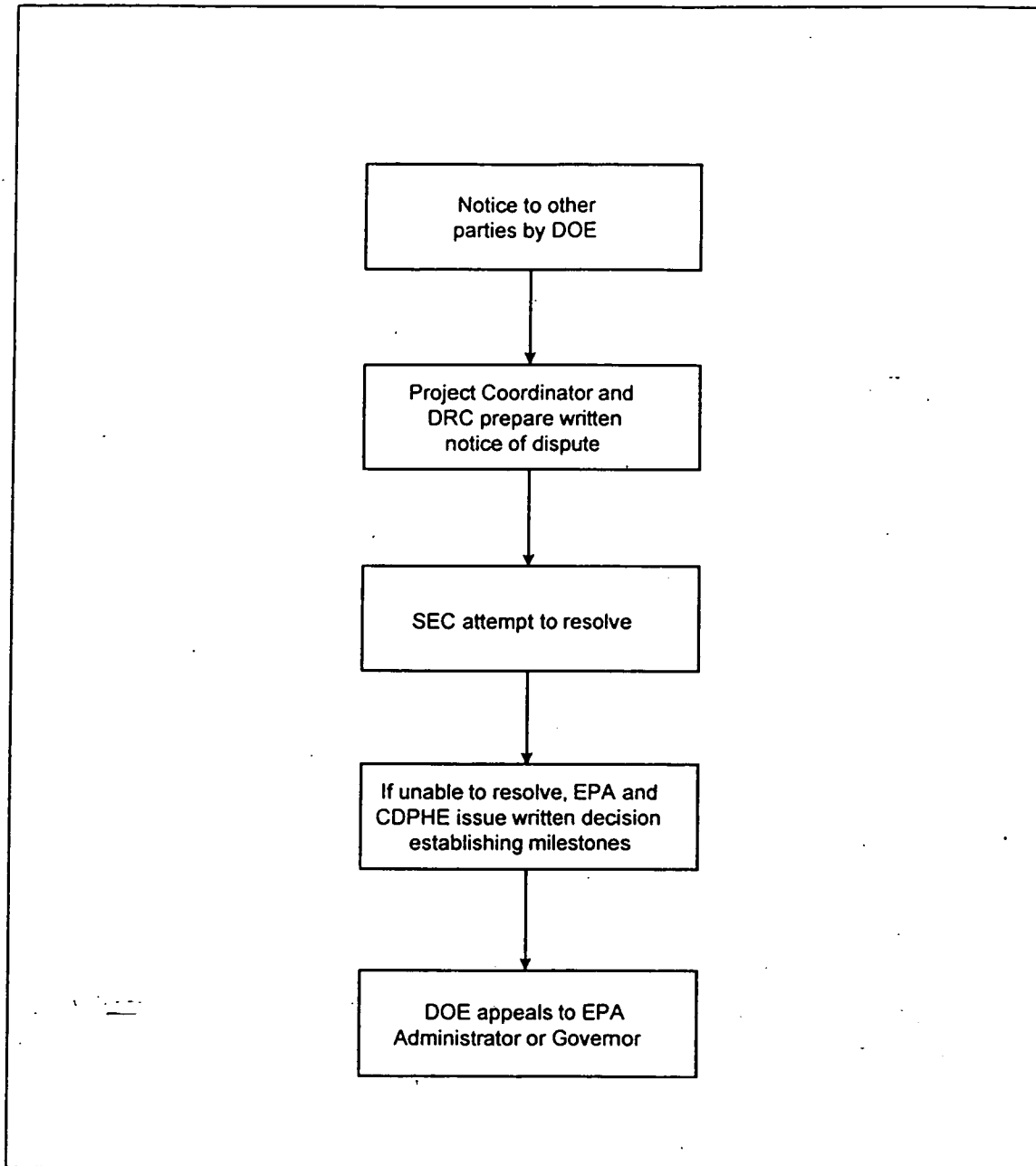


Figure 3-11 Disputes Regarding Budget and Work Planning

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- Treatment systems that will treat wastes from the Industrial Area and the Buffer Zone
- Treatability study reports for activities that are related to more than one OU
- IMP
- Updates to the RFSIPIP
- Updates to the HRR

For a complete listing of Site-wide issues see ¶207 of RFCA. DOE RFFO disputes regarding Site-wide issues employ the procedures diagrammed in Figure 3-12.

3.9.5. Disputes Regarding Overall Direction of Proposed Work

If one of the project coordinators is unable to concur with the overall direction of proposed work, dispute resolution follows the procedures outlined in Section 3.9.1 with minor changes. (See RFCA ¶214).

3.10. MODIFICATION OF DECISION DOCUMENTS

RFCA identifies three types of decision modifications: major modifications; minor modifications; and field modifications. Each type of modification is discussed in the following sections.

3.10.1. Major Modifications

Major modifications represent a significant departure from the approved decision document. RFCA defines major modifications as follows:

[A] modification to work that constitutes a significant departure from the approved decision document or the basis by which a decision was previously made or approved, e.g., a change in a selected remedial technology, a technical impracticability determination or a significant change to the performance of Standard Operating Procedures (SOP) (e.g., a tank closure that results in closure in place versus removal) that fundamentally alters the pre-approved procedure. (See RFCA ¶25ar).

Major modifications to work being done pursuant to a CAD/ROD are accomplished by submitting a written request with justification not less than 90 days prior to executing the change. Concurrently, public notice will be provided followed by opportunity for a 30-day public comment period. Following the public comment, the LRA will, if appropriate, approve the change or deny it and provide a written explanation no longer than 30 days after the close of public comment.

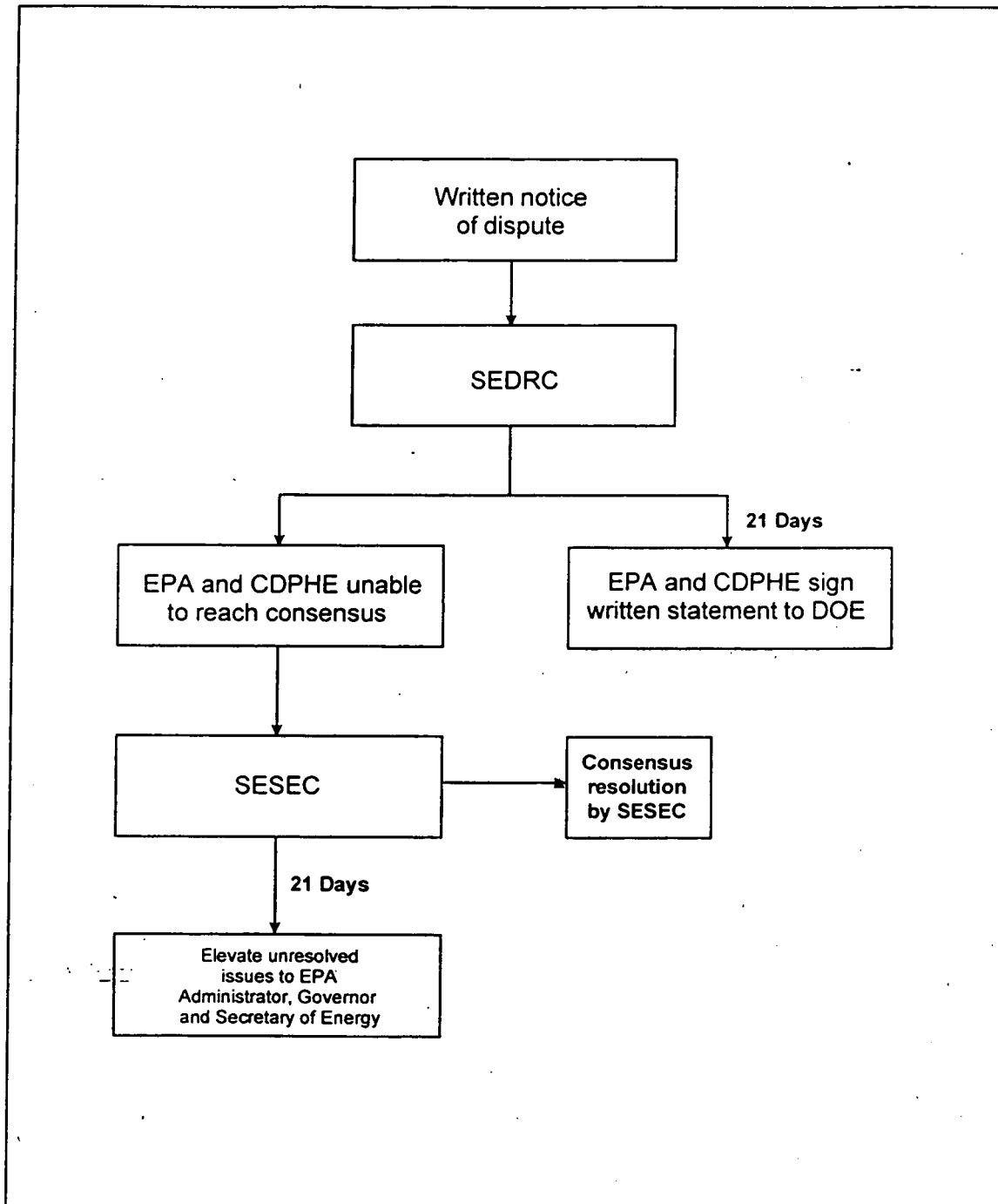


Figure 3-12 Process for EPA/CDPHE Disputes Regarding Site-wide Issues

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Major modifications to work being done pursuant to an IM/IRA are accomplished by submitting a written request with justification not less than 30 days prior to executing the change. The LRA will, if appropriate, approve the change or deny it within 21 days of receipt. For PAMs, the written request must be received no less than 14 days prior to executing the change, and the LRA will approve or deny the change within 7 days.

3.10.2. Minor Modifications

Minor modifications are changes that achieve substantially the same level of performance using a different technique. In effect, the change does not affect the final result of the activity. The RFCA defines minor modification as follows:

[A] modification that achieves a substantially equivalent level of protection of workers and the environment and does not constitute a significant departure from the approved decision document or the basis by which a decision was previously made or approved, but may alter techniques or procedures by which the work is completed, e.g., a change in an RSOP that does not change the final result of the activity (e.g., alteration to a tank closure procedure that still results in a clean closure), or a change in operation or capacity of a treatment system that does not cause the system to exceed an effluent limit.
(See RFCA ¶25as).

Minor modifications to work being done pursuant to a PAM are accomplished by submitting a written notification with justification not less than 7 days prior to executing the change. Prior approval of a minor modification is not required. If the LRA disputes the appropriateness of a minor modification, a stop work order by the LRA must be issued within seven days of notification.

Minor modifications to work being done pursuant to a IM/IRA are accomplished by submitting a written request with justification not less than 21 days prior to executing the change. For an IM/IRA, the LRA will approve the change or deny it with an explanation in writing within seven days of receipt. In appropriate circumstances, the LRA may waive the 21-day waiting period.

3.10.3. Field Modifications

A field modification is allowed when unanticipated conditions are encountered. Field modifications are permitted, without prior approval, to avoid an imminent threat to human health or safety of the environment, prevent undue delay, or where a cost-effective alternative approach to the safe and protective execution of work is identified. (See RFCA ¶25ag).

Field modifications require DOE RFFO project coordinators give verbal notice to the LRA within one day of making the modification and follow the verbal notice with a written justification within seven days. The LRA may issue a stop work order within seven days of the notification if the work is: inadequate or defective; likely to have substantial adverse impacts on other response action selection or implementation processes; or likely to significantly affect cost, scope, or schedule and requires further evaluation.

3.11. NPL DELISTING

The NPL delisting process begins upon approval and acceptance of the final CAD/ROD(s). The NPL deletion process is described in detail in the Close Out Procedures for National Priority List Sites, Interim Final (EPA, 1995a). For a NFA CAD/ROD at sites that have continued passive remediation or monitoring, the following requirements must be met prior to initiation of the NPL Site delisting process:

- Accelerated action close-out reports for all remedial actions (ER and D&D)
- CAD/ROD(s) approval

Subsequent to submittal of the above listed documents, the five step delisting process will be initiated:

- Prepare the Notice of Intent to Delete with EPA and State review and approval
- Publish the Notice of Intent to Delete in the Federal Register for public comment
- Publish the Notice of Availability for the Notice of Intent to Delete
- Publish the Notice of Deletion along with the comment responsiveness summary in the Federal Register
- Place the final information package in local information repositories

It is possible to partially delist those portions of the Site where NFAs or remedies involving institution controls have been implemented. Deletion of the Site from the NPL may occur before the cessation of operation and maintenance activities specified in the CAD/ROD. Additionally, five-year reviews may be required after delisting.

3.12. SOIL MANAGEMENT

(Reserved)

3.13. WATER MANAGEMENT

The site's procedure for the management of incidental waters, Control and Disposition of Incidental Waters (1-C91-EPR-SW.01 Rev. 2), defines incidental waters to include any waters that may accumulate in excavation sites, pits, trenches or ditches, secondary containments or berms, process waste valve vaults, electrical vaults, steam pits and other utility pits and or telephone manholes. Incidental waters also include fire suppression system discharges and the natural collection of precipitation and stormwater runoff in excavation pits, trenches and depressions. The Control and Disposition of Incidental Waters procedure authorizes management of incidental waters using currently available water treatment systems. See Section 2.6.2 for a complete discussion of wastewater and incidental water management options and procedures.

3.14. INTEGRATED MONITORING PLAN

RFCA Part 21 Sections 267 and 268 require the development of an IMP, which collects and reports the data required to ensure the protection of human health and the environment consistent with the Preamble, and which is compliant with RFCA, laws, and regulations, and the effective management of RFETS resources.

The IMP describes Site monitoring performed for a variety of legal, contractual, and operational purposes and states the agreed-upon types of monitoring, monitoring locations, sampling frequencies and purposes of monitoring to meet RFCA goals. In some instances, the IMP includes monitoring that is already required outside of RFCA. The IMP is designed to provide data to support operational and regulatory decisions, and address the following primary regulatory drivers:

- RCRA
- CERCLA
- CAA
- CWA
- Colorado Water Quality Control Commission standards
- Regulations governing natural resource (ecological) management
- Site-specific monitoring and cleanup agreements
- DOE Orders and technical guidance

The IMP Background Document provides additional information on the DQO decision process and the regulatory framework that drives many of the monitoring decisions at the Site, as well as QA/QC requirements. The IMP Background Document is not subject to enforcement under RFCA.

The monitoring program is designed to accomplish the following:

- Detect and identify contaminants in the targeted environmental medium, and monitor their concentrations
- Identify contaminant sources, and monitor remediation efforts
- Delineate contaminant pathways
- Assess the effects of Site remediation and closure activities
- Protect groundwater from new sources of contamination
- Evaluate any impacts of contamination on surface water

The monitoring program reports exceedences of the ALF, which may lead to active management or remediation. Following implementation of such management/remedial actions, the IMP provides the framework to conduct performance monitoring in accordance with the applicable decision document.

RFCA also specifies that the IMP will be jointly reviewed annually "based on previous monitoring results, changed conditions, planned activities and public input." Changes to the IMP are subject to approval of EPA and CDPHE.

The prescribed monitoring is performed in four primary areas: groundwater, surface water, air, and ecological systems. A fifth medium, soil, interacts with each of the other media and is also discussed in the IMP; however, because soil is no longer routinely monitored, the discussion of soil mainly concerns project-specific sampling.

3.14.1. Surface Water Monitoring

Surface water monitoring encompasses five areas:

- Site-wide water quality
- Quality of waters within the Industrial Area
- Quality of discharges from the Industrial Area
- Quality of water leaving the Site
- Off-site water quality

3.14.2. Air Quality Monitoring

The air monitoring activities on the Site assist in protecting the public and the environment by detecting and assessing the impacts of Site operations on air quality at and near the Site, characterizing any airborne materials that may be introduced, and monitoring the meteorological conditions that influence the transport and dispersion of airborne materials.

3.14.3. Ecological Monitoring

Ecological monitoring is designed to verify the effectiveness of wildlife protection in the Buffer Zone, including any special-concern species (i.e., threatened, endangered, candidate, proposed, state-listed, or other sensitive species). In addition to the terrestrial vegetation communities, the aquatic communities of the riparian channels and ponds at the Site are monitored for ecological health.

3.14.4. Groundwater Monitoring

Most of the groundwater at the Site is hydraulically connected to surface water. The groundwater monitoring program is designed to accomplish the following:

- Detect and identify contaminants in groundwater and monitor their concentrations
- Identify contaminant sources and monitor remediation efforts
- Delineate contaminant pathways
- Assess the effects of Site remediation and closure activities
- Protect groundwater from new sources of contamination
- Evaluate any effects of contaminated groundwater on surface water

The main (COCs) are volatile organic compounds (VOCs), which originated from the site's historical chemical use and storage during its years of producing nuclear weapons components. Possible sources of contaminants that could affect groundwater include storage tanks, the process wastewater system, drains, sumps, historical storage areas, and spills. The monitoring scope is designed to be conducted before, during and after RFETS operations that may affect groundwater quality.

4. ADMINISTRATION

This section provides an overview of the following:

- The federal budgeting process
- Requirements for budget planning and authorization
- Controlling a project
- Compilation of the AR
- Records management and document control
- Reporting requirements

Section 4.0 has been written in conjunction with RFCA and RFETS standard policies and practices that provide policy and procedural direction for the diverse administrative functions performed at RFETS. The referenced plans, procedures, and documents are intended to supplement the guidance and minimum requirements presented in this section.

4.1. BUDGET PLANNING AND EXECUTION

All RFETS budgeting is performed in accordance with approved RFETS budget planning, formulation, and execution procedures. A summary of the budget planning and execution process is provided on Figure 4-1, General Timeline for Budget, RFETS CPB, RFCA Milestones, and K-H Performance Measures.

Funding at RFETS is based on the Fiscal Year (FY) cycle. The federal FY starts on October 1 and ends on September 30 of the following year. The FY is designated by the calendar year in which it ends. At any given time, four FYs are under consideration:

- PY – Prior Year (the previous FY completed)
- FY (the current FY or the execution year)
- FY+1 (also called the budget year) – where Congress considers DOE's budget request
- FY+2 (the first planning year) – where RFETS activity requirements are identified
- FY+3 through FY+5 (and beyond for some activities) – where budget plans are developed

The budget process has three main phases: (1) executive budget formulation and transmittal; (2) Congressional action; and (3) budget execution and control. Each of these phases is discussed in the following sections.

Final RFCA: IGD

Appendix 3

July 19, 1999

	October	November	December	January	February	March	April	May	June	July	August	September	October	November	December
Federal Budget Process (Row A)	DOE-HQ and OMB negotiate FY+1 budget based on DOE FY+2 submittal the previous spring (B-4).				President submits FY+1 budget to Congress. [A-2]	Congressional appropriations hearings, and negotiations with DOE and OMB. [A-3]						President signs FY+1 federal appropriations bills into law. [A-4]			
FETS Budget/Planning (Row B)		RFFO gets FY+2 planning, budget call from HQ. [B-1]	RFFO reviews and updates FY+2 budget, including any additional work, and Ten Year Plan, receives input from President's FY+1 budget submittal (A-2). [B-2]			FY +2 budget and planning meetings with stakeholders and DOE-HQ. FY+2 document revisions. [B-3]		RFFO submits FY+2 budget to DOE-HQ. [B-4]	RFFO gives Kaiser-Hill Program Execution Guidance for FY+1. [B-5]	RFFO finalizes FY+1 baseline budget. [B-6]		RFFO sets FY+1 baseline budget, with input from DOE-HQ (A-4), final ISB (C-4). [B-7]			
Integrated Site-wide Baseline (Row C)	RFFO and Kaiser-Hill budget and planning staffs revise draft FY+1 and FY+2 ISB (same staffs are also developing FY+2 budget and Ten Year Plan materials in B-2). [C-1]					Revised FY+1, +2 ISB, mult. Scenarios (B-2, D-4, D-9). [C-1]			Revised FY+1, +2 ISB, mult. scenarios (B-2, D-4, D-9). [C-3]	Final FY+1, FY+2 ISB by Aug. 1, based on site budget (B-6). [C-4]					
RFCA Milestones & Target Activities (Row D)			RFFO, after consulting with Parties and CAB, proposes FY+2 activities and relative priorities. [D-1]	Parties agree, or regulators set, FY+2 Milestones and Target Activities. [D-2]	Dispute Resolution begins for disputed FY+2 Milestones and Target Activities. [D-3]	EPA and CDPHE set FY+2 Milestones even if no consensus exists. [D-4]		Re-evaluate current FY progress, and adjust FY+1, +2 accordingly, input from C-3. [D-5]	Informal DRC-level meeting to continue evaluating FY+1, +2 Milestones and Target Activities. [D-6]			Final FY+1, +2 agreement; input from final budget (B-7). [D-7]	FY budget allocation; Parties consult on FY, FY+1 Milestones and Target Activities. [D-8]	Re-establish FY and FY+1 Milestones and Target Activities, or begin Dispute Process. [D-9]	
Kaiser-Hill Performance Measures (Row E)						1st cut at FY+1 PMs, based on C-2. [E-1]	RFFO and K-H agree on selection criteria, scope. [E-2]		2nd cut at FY+1 PMs, based on C-3. [E-3]	Negotiate FY+1 PMs, starting July 1. [E-4]		Final FY+1 PMs; requires step B-7. [E-5]	Maintain FY Performance Measures. [E-6]		
Regulatory Agency Reviews (Row F)		RFFO shares FY+2 budget call to Parties, CAB (B-1). [F-1]	RFFO shares FY+1 budget, based on A-2. [F-2]			RFFO briefs CAB Parties on FY+1 impacts. [F-3]					Parties evaluate current FY projects, especially those critical to RFCA Milestones. [F-4]		RFFO briefs Parties on FY allocations. Parties evaluate FY, FY+1 projects. If no agreement is reached within 60 days after budget allocation, regulators set milestones and Parties begin Dispute Resolution Process. [F-5]		

Figure 4-1 General Timeline for Budget, CPB, RFCA Milestones and K-H Performance Measures

4.1.1. Executive Budget Formulation and Transmittal

The budget formulation process begins at least 14 to 18 months before the budget request is transmitted to Congress by the President. DOE RFFO prepares its budget request based on the guidelines provided by the President through the Office of Management and Budget (OMB) and through DOE Headquarters (HQ). (See Figure 4-2).

The budget is developed in the context of a multi-year budget planning system that includes coverage of the current FY as well as the FYs beyond FY+1. In FY 1997, the planning process was expanded to include coverage of all project years required to complete the RFETS mission and is not limited to four FYs. The system requires that broad budgetary goals, agency spending, and employment targets be established beyond the budget year.

During the formulation of the budget, there is a continual exchange of information, proposals, evaluations, and policy decisions among DOE RFFO, DOE HQ, OMB, and the President. Decisions concerning the upcoming budget are influenced by the results of budget validation reviews, previously enacted budgets (including the one being executed by the agencies), and the reactions to the last proposed budget under consideration by Congress. In accordance with current law, the President submits final agency budget requests to Congress no later than the first Monday in February.

4.1.2. Congressional Action

Between February and September 30, Congress is considering all federal agency budget requests. If Congress does not complete its work before the start of the FY (October 1), then a Continuing Resolution (CR) may be enacted for a given amount of time to keep agencies operating at the same level as the prior FY. During a CR, no new projects or activities may be started.

At any time, Congress can change funding levels, eliminate programs, enact legislation that authorizes an agency to carry out a program, or add programs not requested by the President or an agency. After the appropriation process, the program may be realigned through a reprogramming request. Both actions require OMB and Congressional approval.

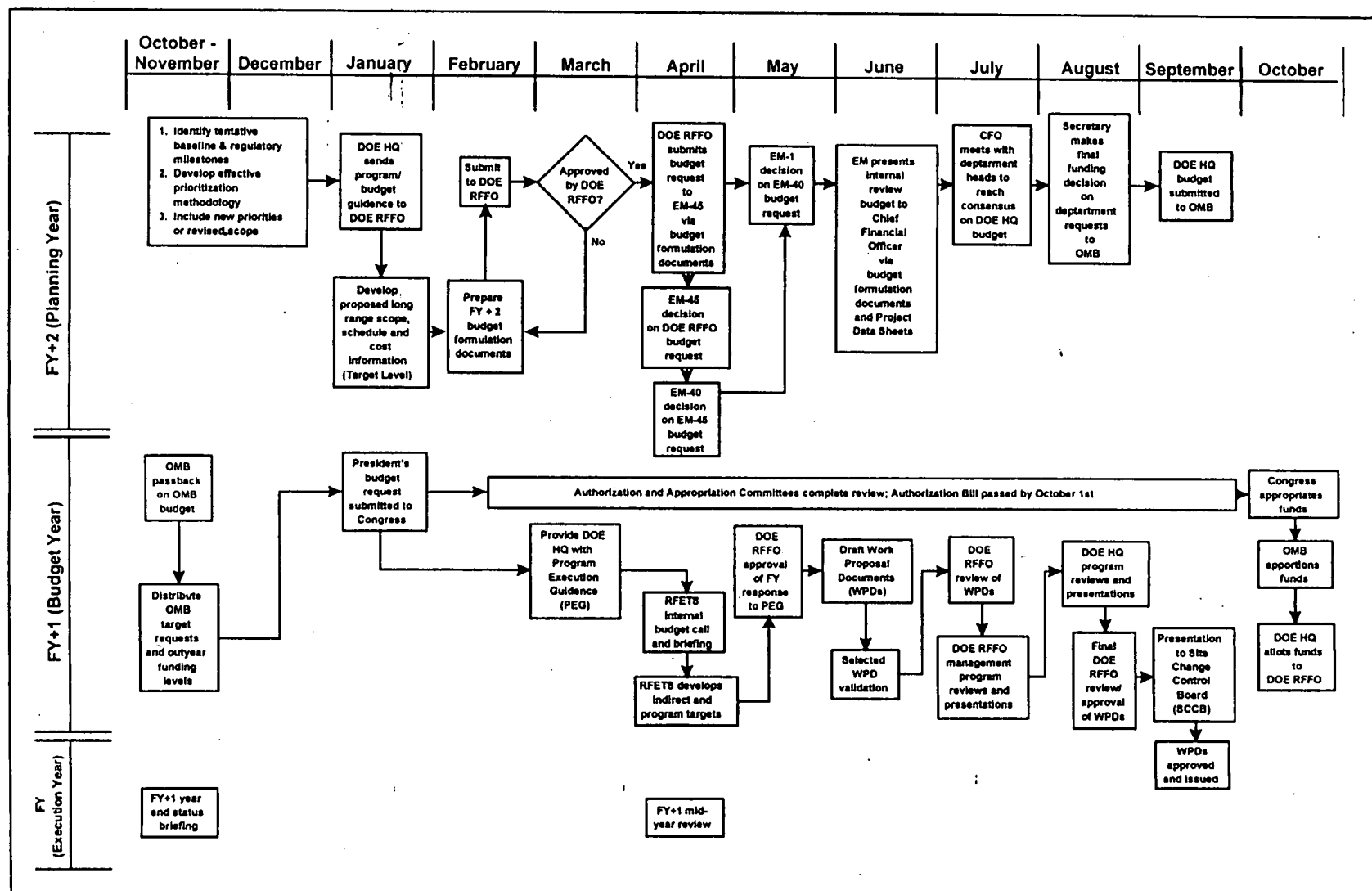


Figure 4-2 The Federal (DOE) Budget Execution Process

4.1.3. Budget Execution and Control

Once approved, the President's budget, as modified by Congress, becomes the basis of the financial plan for the operations of each agency during the FY. The sequence is as follows:

- The Director of OMB apportions appropriation (funding) to DOE HQ by time periods and by activities
- DOE HQ allocates funds to the various sites across the DOE complex, which include RFFO

For the remainder of the FY, DOE RFFO budget execution focuses on monitoring the site contractor's progress in performing RFETS cost baseline activities.

4.2. PROJECT PLANNING AND BUDGET PROCESS

To accomplish work at RFETS, the internal authorization basis process is closely coupled with RFETS CPB, and the provisions of the RFCA provide the planning and scope for achieving the RFETS Vision:

- To achieve accelerated cleanup and closure of RFETS in a safe, environmentally protective manner and in compliance with applicable state and federal environmental laws
- To ensure the RFETS does not pose an unacceptable risk to the citizens of Colorado or to the site's workers from either contamination or an accident
- To work toward the disposition of contamination, wastes, buildings, facilities and infrastructure from RFETS consistent with community preferences and national goals

4.2.1. Project Planning/Project Scoping

The RFETS system incorporates methods and procedures for planning, authorizing, and controlling a project so that work can be performed to defined specifications, schedule, and budget. The system defines the processes for:

- Organizing and defining work
- Assigning, planning, and authorizing work

- Measuring work performed
- Analyzing and reporting costs of work performed
- Controlling changes to an established baseline by use of a Site Change Control Board

All RFETS project planning is done in accordance with approved site procedures.

Scope

The project scope formally establishes the project mission, functional objectives, scope of work, technical approach, regulatory requirements, and assumptions. Project scope is determined by the project mission needs, objectives, and regulatory requirements. Project scope is outlined in a Project Baseline Description (PBD).

Schedules

The critical path method of scheduling is used for establishing schedule baselines. Total life-cycle of a project is scheduled; however, near-term work may be in greater detail than out year work. Ongoing coordination between EPA, CDPHE, and DOE RFFO will occur to determine the appropriate target dates for intermediate milestones for multi-year projects.

Closure Project Baseline

All work performed by DOE at RFETS will be scheduled and integrated by inclusion in a controlled master resource-loaded critical path method schedule, referred to as the CPB, that will include the life-cycle schedule of all the work scope required to achieve the RFCA Vision. Schedule detail will reflect a "Rolling Wave" method of scheduling, which produces a decreasing level of detail as time is extended from the current FY. The CPB will be used to direct and manage the RFETS work efforts while being the basis for current year and out year budgeting and planning. All scheduled reports, both internal and external (DOE, EPA, CDPHE, stakeholders, etc.) will be produced from the CPB. Individual schedules not incorporated into the CPB will not be recognized.

The CPB is the basis against which planning and project performance will be evaluated. A cost- and resource-loaded schedule allows the evaluation of planning alternatives as they relate to funding and resource constraints, while insuring the plan maintains the logical sequence of activity execution as the plan proceeds through multiple iterations. The CPB will also be used to manage the project and evaluate performance in prior and current fiscal years. The current working schedule and budgets will be updated using actual costs and schedule status to be compared to the baseline in the calculation of cost and schedule variances.

RFETS has developed a CPB that describes activities necessary to achieve the end of the Intermediate Site Condition as defined in the RFCA Preamble. The CPB reflects planning assumptions that are agreed to by DOE RFFO, EPA, and CDPHE. Changes to the project baseline that could lead to delays of important milestone completion dates will be approved by

DOE, EPA, and CDPHE as defined in RFCA. The CPB shall be reviewed monthly and updated as required, and annually at a minimum.

Closure Project Schedule

The Closing Project Schedule (CPS) is a schedule depicting activities necessary to achieve the end of the Intermediate Site Condition. This schedule will reflect data found in the CPB. The Expanded Management Summary Schedule is a summary representation of the CPS.

RFCA Change Control

The RFCA change control process is the mechanism used by DOE RFFO, EPA, or CDPHE to assure that scope, schedule, or cost changes are reviewed for need, justification, and impact in a structured manner, and to assure that all parties can fulfill their responsibilities. This process is defined in the RFCA, Part 10 (Changes to Work). If the change will affect regulatory milestones, DOE RFFO will identify proposed modifications to the regulatory milestones in accordance with RFCA, Part 12 (Changes to Regulatory Milestones) and notify the other parties of modifications to the baseline.

Milestones

EPA and CDPHE will establish milestones from the CPB; no more than 12 milestones per FY for FY, FY+1, and FY+2. Milestones will be designed to:

- Provide accountability for key commitments
- Ensure adequate progress at the site
- Provide adequate scope drivers
- Facilitate budget planning and execution

EPA and CDPHE may also establish a few key out year milestones (i.e., beyond FY+2) to provide long-term drivers for achieving the end of the RFCA Intermediate Site Condition (See RFCA preamble for description).

Regulatory Milestone Change Control Process

A regulatory milestone that is established according to the provisions of RFCA shall be changed upon receipt of a timely request for change, provided good cause exists. Requests for change shall be submitted no less than 30 days before the date of the regulatory milestone except for changes sought on the basis of a force majeure. Consistent with §165 of RFCA, any request for change shall be submitted in writing and shall specify:

- The regulatory milestone that is sought to be changed
- The length of the change sought
- Good cause(s) for the change
- Any related regulatory milestone or target date that would be affected

if the change were granted

4.3. REGULATOR INTERACTION IN THE BUDGET AND PLANNING PROCESS

This section provides an overview of regulatory participation in the RFETS budget and planning process for FY, FY+1, and FY+2. Refer to Part 11, Subpart A, ¶s 133-149 of the RFCA for detailed information regarding these interface points

4.3.1. FY Activities

FY activities are those that occur during the current FY. These activities are as follows:

April through May

Within 30 days following the completion of DOE annual mid-year management review, DOE RFFO will brief EPA and CDPHE on any decisions that affect the CPB and RFCA regulatory milestones

July through September

DOE, EPA, and CDPHE will evaluate the current schedule, cost and funding status of all projects in progress in the just-ending fiscal year, particularly those activities or projects that are on the critical path to meet regulatory milestones in the upcoming two fiscal years

In addition, the DOE, CDPHE, and EPA RFCA Project Coordinators will meet periodically through the FY to monitor and discuss the status of projects scheduled during the year. DOE RFFO will promptly notify EPA and CDPHE of any proposed site-specific or programmatic action, if such action may have an impact on DOE's ability to meet the baselines or regulatory milestones of RFCA.

4.3.2. FY+1 Activities

FY+1 activities are those that are being planned during the current FY and will be performed in the next FY. These activities include the following.

January through May

- DOE RFFO will submit to CDPHE, EPA, and the RFCAB a summary of the DOE budget request

July through October

- DOE RFFO will provide EPA, CDPHE, and the RFCAB with copies of the Program Execution Guidance (PEG)

- DOE RFFO will consult with EPA and CDPHE in the development, verification, and review of draft Work Proposal Documents (WPDs) and CPB for FY+1.
- DOE RFFO will review and revise CPB and regulatory milestones and target activities as necessary

October through December

- DOE RFFO and DOE HQ will brief EPA and CDPHE on the federal budget appropriation and tentative funding
- No more than 60 days after OMB apportions DOE funds, DOE RFFO, EPA, and CDPHE will evaluate schedule, cost, and funding status of projects for the new FY to incorporate information into budget, milestone, and target DOE activities

If there is a delay in Congressional appropriations beyond the first day of the new fiscal year, DOE RFFO will inform EPA and CDPHE of any CRs, and of the impact of the delay on its ability to meet regulatory milestones and other requirements of the RFCA. EPA and CDPHE will review these actions and may recommend reallocation of available funds.

4.3.3. FY+2 Activities

FY+2 activities are those which are being planned during the current year and will be performed two years from the current FY.

January through April

- Within one week after DOE HQ issues planning/budget guidance, DOE RFFO will provide a copy of guidance to the EPA and CDPHE
- Within three weeks after DOE RFFO receives target level funding, DOE RFFO will provide its preliminary RFCA impact assessment
- Before submittal of the FY+2 budget request to DOE HQ, FY+2 baselines, regulatory milestones and target activities will be established or revised

4.3.4. Roles and Responsibilities

The budgetary roles and responsibilities for DOE RFFO include:

- Requesting necessary funds to meet RFCA regulatory milestones, target activities, and other commitments/requirements
- Interacting with DOE HQ regarding budget formulation document submittals, the presidential budget submittal, and problems with the RFETS cost baseline and budget
- Communicating RFETS objectives and priorities
- Conveying information and guidance to CDPHE, EPA, and the RFCAB

DOE RFFO's role focuses on maintaining the RFETS's CPB, preparing budget formulation documents, and ensuring that projects have the proper authorization basis for planning and execution. The role of CDPHE and EPA focuses on evaluating the CPB and funding status of projects to determine if the RFETS budget is adequate for meeting RFCA requirements and other environmental laws, and to establish milestones and target activities for the budget and planning years. EPA and CDPHE should be involved early in the budget process during the consultative process set forth in RFCA. All RFCA Parties have the responsibility to identify areas in the CPB where cost savings can be achieved to free funding for additional risk reduction activities.

4.3.5. Cost Savings Initiatives and Productivity Improvements

EPA and CDPHE shall consult with DOE RFFO during the RFETS budget planning and execution processes and other times deemed appropriate to identify and evaluate opportunities and incentives to improve productivity and reduce costs associated with activities at RFETS.

Standards, requirements, and practices shall be regularly reviewed to determine that activities at RFETS are conducted in a manner that is sufficient to achieve compliance with requirements and to protect workers, the public, and the environment, and necessary to accomplish the RFCA preamble objectives expeditiously and efficiently. Refer to RFCA ¶s 158-162 for additional guidance on cost savings and productivity improvements.

4.4. ADMINISTRATIVE RECORD/RECORDS MANAGEMENT/DOCUMENT CONTROL

4.4.1. Administrative Record

The AR is the compilation of documents relied on by DOE RFFO to select a response action for cleanup of a hazardous waste site. In accordance with Section 113(k) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986, AR files will be maintained for CERCLA response actions at or near RFETS, following EPA policies and guidelines. DOE RFFO is ultimately responsible for AR contents for RFETS.

The AR will be kept in accordance with CERCLA, NCP, and OSWER Directive 9833.3a-1 (EPA, 1994a) *Guidance on Administrative Record for Selecting of CERCLA Response Actions* and AR Implementation Procedure 2-S65-ER-ADM-17.02 *Administrative Record Document Identification and Transmittal* (RMRS, 1995a). An AR shall be established for each OU, for each ER action, and for each decommissioning action. Documents necessary to be included in each AR are delineated in OSWER Directive 9833.3a-1 (EPA, 1994a). (Appendix R).

RFETS procedure 1-F78-ER-ARP-001 *CERCLA Administrative Record Program* (RMRS, 1994b), establishes and defines the requirements and responsibilities for the compilation and maintenance of CERCLA AR files and completed ARs. Any future changes to AR policies and

guidelines affecting the AR files shall be discussed by DOE RFFO, EPA, and CDPHE and an agreement shall be reached on how best to accommodate those changes.

EPA, after consultation with CDPHE when necessary, shall make the final determination of whether a document is appropriate for inclusion in an AR. EPA and CDPHE shall participate in compiling the AR by submitting documents to DOE RFFO as EPA and CDPHE deem appropriate. DOE RFFO will forward these documents to the RFETS AR files. Every AR file will be reviewed and approved by DOE RFFO, EPA, and CDPHE (i.e., Site Technical Administrative Record Review [STARR]) before the file is closed at the signing of the appropriate decision document.

Four information repositories have been established to provide the public with access to the AR. A copy of the AR is accessible to the public at times other than RFETS normal business hours through the Public Reading Room at Front Range Community College.

Information Repositories:

U.S. Environmental Protection Agency
Region VIII
Superfund Records Center
999 18th Street, Suite 500
Denver, Colorado 80202-2466
(303) 312-6473

Rocky Flats Citizens Advisory Board
9035 Wadsworth Parkway
Suite 2250
Westminster, Colorado 80021
(303) 420-7855

**Colorado Department of Public Health
and Environment**
Information Center, Bldg. A
4300 Cherry Creek Drive South
Denver, Colorado 80220-1530
(303) 692-3312

U.S. Department of Energy
Rocky Flats Public Reading Room
Front Range Community College Library
3645 West 112th Avenue
Westminster, Colorado 80030
(303) 469-4435

4.4.2. Records Management

The objectives of the RFETS records management program are to identify, capture, protect, and maintain active project records for both ER and decommissioning; index active records to ensure efficient and effective retrievability; safeguard records to prevent loss, damage, or unauthorized accesses; and turn over inactive records to the RFETS for disposition in accordance with approved record retention schedules. Final records disposition shall be approved by the DOE RFFO designee and be consistent with the CERCLA, RCRA, CHWA, and DOE RFFO records retention schedules, whichever is longer. DOE shall make all such records or documents available to CDPHE and EPA upon request.

RFETS procedure 1-V41-RM-001, *Records Management Guidance for Records Sources* (RMRS, 1996c), provides detailed guidance on the RFETS Records Management Program. Procedures for

implementation of the records management program elements identified in the above procedure are: (1) RM-06.03 *Records Receipt, Processing, Retrieval, and Disposition* (RMRS, 1997a); and (2) RM-06.02 *Records Identification, Generation, and Transmittal* (RMRS, 1997b).

4.4.3. Document Control

Document control is the process of managing the authorized release of specific documents and changes to ensure that only the most current, approved-for-release copies of controlled documents are used to perform program activities, including those that prescribe activities affecting quality and safety. RFETS procedure 1-77000-DC-001, *Document Control Program* (RMRS, 1993), establishes requirements responsibilities, and instructions for the identification and control of controlled documents.

4.5. REPORTING

All reporting shall be done in accordance with established DOE HQ and DOE Environmental Management policies and requirements. DOE-stipulated elements focus on cost, schedule, and technical performance against approved baselines. Additional reporting requirements established by DOE RFFO are provided in RFETS policy 1-R97-F&A-MCS-001, *Management Control Systems and ER Project Control Management Procedures and Requirements* (RMRS, 1996d).

RFCA Project Coordinators will meet at least monthly to discuss accomplishments, work in progress and anticipated work, potential changes to the baseline, implementation difficulties, compliance issues, opportunities for streamlining, and other matters of importance to implementation.

Quarterly, DOE RFFO will provide EPA and CDPHE with a progress report that describes progress toward implementation of activities covered by RFCA. Whenever possible, existing reports and databases will be used to fulfill this reporting requirement. Upon request, DOE RFFO will provide EPA and/or CDPHE with copies of project status reports on a monthly basis.

5. PUBLIC INVOLVEMENT AND STAKEHOLDER SUPPORT

5.1. BACKGROUND

Public involvement is an important part of the RFCA Vision. An effective public involvement strategy, as part of routine project planning, is required by both law and DOE policy for many project activities. In addition, it is the best management practice on any project potentially impacting public health. This section describes the RFETS approach to involving stakeholders in project decision making as RFETS progresses toward cleanup and closure.

All public involvement activities will be conducted in compliance with applicable requirements under NEPA, CERCLA, RCRA, and DOE Orders and guidelines. Those requirements and guidelines are identified in the RFSIIP.

5.2. PUBLIC INVOLVEMENT OBJECTIVES

The RFSIIP is designed to increase stakeholders' understanding of the site's ER and waste management programs and to open avenues for stakeholders to participate in RFETS decision-making processes. This program has been developed to:

- Provide accurate and timely information about environmental contamination and hazardous materials, cleanup plans, monitoring, and implementation progress
- Ensure stakeholders have the opportunity to provide input regarding planned actions and to have their opinions considered in decision-making
- Ensure DOE RFFO and its contractors understand and take into account stakeholder values and concerns
- Meet RCRA, CERCLA, NEPA, and RFCA public involvement requirements

Public involvement in the decision-making process will be conducted using the Rocky Flats Public Participation Guidance, which was created to ensure public involvement at RFETS meaningful (i.e., influential in the site decisions) and to optimize the effectiveness of public involvement efforts.

Additionally, public participation will adhere to the following guidelines and principles as outlined in RFCA:

- Ongoing consultation with the local elected officials
- Consistency with the RFETS long-term vision, mission, and budget
- Clear linkage to a decision-making process
- Adherence to state and federal requirements

- Stakeholder consultation on significant public policy issues, even if there is no legal requirement for involvement
- Inclusion of various and diverse community groups and people with varying levels of knowledge and understanding of RFETS issues

5.3. PUBLIC INVOLVEMENT PLANNING

It is the responsibility of all managers at RFETS to plan for the appropriate level of stakeholder involvement as a primary element of site closure projects. Stakeholder involvement before selection of alternatives ensures decisions are made with full awareness of all relevant issues. Failure to involve stakeholders input at appropriate times can result in costly project delays and reformulation of plans. In developing a public involvement strategy, managers should base decisions about the level and timing of public involvement on the following:

- Probable impact on stakeholders
- Likelihood of value conflicts among stakeholders
- Level of perceived risk to stakeholders
- Uneven distribution of impacts of alternatives among stakeholder groups

Managers should consult with the DOE RFFO Office of Communication (OOC) during the project planning stages to develop a strategy for involving the public in project decisions, as well as to develop the tools necessary to implement that strategy. The OOC will prepare information for managers' use while engaging the public. The OOC coordinates outreach programs (e.g., Speakers Bureau and Tours and Visits) to promote additional face-to-face interaction.

Project-specific public involvement strategies, while not required for all projects, will provide the framework for soliciting stakeholder input. These strategies, or "mini" public involvement plans should identify the desired outcome of the strategy, the primary audience, the message, sensitive issues, and tools to be used.

Once the level of public involvement has been identified, it is important to communicate clearly what role the stakeholders have in the decision making process, to explain how the public fits into that process, and how public input will affect the decision. As a project progresses through planning into implementation, the extent to which public input can be effective will decrease. Accurately communicating the appropriate level of involvement can reduce misunderstanding.

5.4. PUBLIC INVOLVEMENT TOOLS

Using the tools below, the public involvement strategy will adhere to the objectives and meet requirements set forth in NEPA, RCRA, CERCLA, RFCA, and DOE Orders and guidelines. Other tools and resources can be developed and used as needed to promote effective public involvement. The OOC supports management in the proper use of these tools:

Briefings, Presentations & Discussions

Upon request, and to the extent possible, subject matter experts will meet with schools, groups, elected officials, regulators, individual stakeholders, and stakeholder organizations. The OOC prepared presentations on numerous topics are available for use.

Public Hearings & Public Information Meetings

The Site schedules public hearings and/or meetings as needed to disseminate information and accept feedback on key activities. Hearings usually are scheduled close to the midpoint of a public comment period. Public Information Meetings are not necessarily tied to specific public comment period and incorporate as many topics as appropriate to warrant the meeting. The OOC will plan, coordinate, and facilitate these public forums.

Employee Meetings

Employees are among the most important stakeholders at RFETS. It is important to keep employees informed and ensure they understand how their work contributes to the successful cleanup and closure of the site. Town hall meetings, cascading meetings, Manager's Information Meetings, staff meetings, and written and electronic newsletters provide to keep employees informed and solicit employee feedback about site activities.

News Releases and Community Advisories

The OOC disseminates information to news media outlets and key stakeholders and groups. In addition, the OOC serves as the point of contact for inquiries from news media and stakeholders.

Fact Sheets

The OOC creates brief informational materials (usually one or two pages in length) that identify key elements of specific projects and activities. Fact sheets describe processes and activities to assist stakeholders in understanding the projects.

Mailing List(s)

RFETS maintains a facility mailing list of about 2,000 stakeholders interested in obtaining information about the Site. Separate mailing lists (e.g., RCRA mailing lists) are maintained that contain the names of smaller numbers of stakeholders interested in receiving information on specific topics.

Public Tours

The OOC coordinates, plans, and conducts tours of the site to allow interested parties a first-hand look at work being accomplished at RFETS.

Speakers Bureau

Knowledgeable site employees visit schools, civic groups, stakeholder organizations, and other groups to inform small audiences of site activities relevant to their interests.

Reading Rooms

There are four locations throughout the Denver metropolitan area where interested parties can access information about RFETS. The Rocky Flats Public Reading Room contains thousands of documents relating to RFETS and other DOE weapons complex sites.

Electronic Access to Information

Site information is available through Internet and Intranet access. Information for public dissemination will be made available on-line for stakeholders. An option of submitting comments on-line is in planning.

5.5. CONTACT NUMBERS

Involving the public in RFETS decisions and clearly communicating stakeholders' roles in affecting decisions are paramount to successful Site closure. Regardless of legal requirements for public involvement, involving the stakeholders in decision-making building public trust and confidence that RFETS is being managed in the public interest. Teamwork between project managers, the OOC, and affected stakeholders will promote an effective strategy and use of communication tools to inform and involve stakeholders in the project activities.

OOC Contact Telephone Numbers

DOE Communication	(303) 966-5993
K-H Communication	(303) 966-7412

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Appendix A

RFETS ENVIRONMENTAL CHECKLIST

ENVIRONMENTAL CHECKLIST
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

Form Revised 5/22/97

1. Project Name:
2. Date Submitted:
3. NEPA Tracking No.:
4. Charge Number:
5. WPD Number:
6. Project Manager:
7. Initiating Line Manager:
8. Preparer (Bldg., Ext.):
9. Project Description (be as detailed and specific as possible, use the checklist as a guide for issues to be addressed in the description of the project, submit to K-H NEPA for review):

Reviewed for Classification/UCNI

By: _____

Date: _____

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NOTES

YES

NO

10. Will the project require or potentially require permit application(s) or permit modification(s) under the:

- A. Clean Air Act? (e.g., APENs, Rad-NESHAP, and fugitive dust)
B. Clean Water Act? (e.g., discharges, and chemicals)

11. Resource Conservation and Recovery Act (RCRA):

- A. Does the project generate, treat, store, or dispose of hazardous, radioactive, or mixed waste?
B. Does the project involve a removal?
C. Does the project include RCRA closure? -partial? -full?
D. Does the project include excavation or capping to meet RCRA requirements?
E. Will cost and duration stay within \$5 million and 60 months? (Explain in Section 9, Project Description)
F. Will a RCRA permit or permit modification be required?

12. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

- A. Is the project part of an activity required in the Rocky Flats Cleanup Agreement?
B. If the answer to A. is YES, is the project described in a document that has been approved by EPA or CDPHE, or will be approved by at least one of those agencies before project work begins?
C. If the answers to both A. and B. are YES, has that document been reviewed by the National Environmental Policy Act (NEPA) Group for inclusion of NEPA values?
D. Has the project evaluated the potential for RFCA or IM/IRA performance monitoring obligations, and if appropriate, taken steps to implement those obligations through the IMP?

13. A. Will the project require performance monitoring per RFCA or IA IM/IRA requirements? _____
- B. If the answer to A is YES, have appropriate steps been taken to implement those requirements through the Integrated Monitoring Plan? _____
14. Will the project create TSCA-regulated waste (asbestos & PCBs)? _____
15. Have all steps been taken to ensure compliance with procedures 1-G98-EPR-END.04, Migratory Bird Evaluation and Protection, and 1-D06-EPR-END.03, Identification and Protection of Threatened, Endangered, and Special-Concern Species? _____
16. Will the project be in or near an Individual Hazardous Substance Site (IHSS)? _____
17. Will this project construct or require a new or expanded waste disposal, recovery, storage, or treatment facility? _____
18. Is the project part of an agreement between DOE and another federal or state agency? (Specify and explain any schedule urgency and deadlines in Section 11, Project Description.) _____
19. Is the project:
- A. A new process, building, etc.? _____
- B. A modification to an existing process, building, etc.? _____
- C. An installation of capital equipment _____
20. Will the project be located in, or adversely affect designated:
- A. Wetlands? (i.e., dredge, fill operation) _____
- B. Natural areas? _____
- C. Prime agricultural land? _____
- D. Special water sources? _____
- E. Historical, archaeological, or architectural sites or buildings? (NHPA, HUD) _____
- F. Impact surface water or groundwater _____

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- | | | | |
|-----|---|-------|-------|
| 21. | Will the project result in, or have the potential to result in, long term changes to the environment? | _____ | _____ |
| 22. | Will the project result in changes or disturbances of the following existing conditions: | | |
| | A. Noise levels? | _____ | _____ |
| | B. Solid wastes? | _____ | _____ |
| | C. Radioactive wastes? (including disturbed or excavated contaminated soil) | _____ | _____ |
| | D. Hazardous waste? | _____ | _____ |
| 23. | Will the project have effects on the environment which are likely to be publicly controversial? | _____ | _____ |
| 24. | Will the project establish a precedent for future projects that will have significant effects, or represent a "decision in principle" about a future consideration? | _____ | _____ |
| 25. | Is the project related to other projects or to a larger program? | _____ | _____ |
| 25. | Have pollution prevention measures been considered? (Discuss in Section 11, Project Description.) | _____ | _____ |
| 26. | Does/Will the project present a radiation health and safety concern during construction or operation? (Price-Anderson Act) | _____ | _____ |

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Appendix B

**PREPARATION OF AN ER
INTERIM MEASURE/INTERIM REMEDIAL ACTION
DOCUMENT**

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APPENDIX B

1.0 PREPARATION OF AN ER INTERIM MEASURE/INTERIM REMEDIAL ACTION DOCUMENT

RFCA §107 describes the IM/IRA process. That paragraph states:

The draft IM/IRA shall contain a brief summary of data for the site, a description of the proposed action, an explanation of how waste management considerations will be addressed, an explanation of how the proposed action relates to any long-term remedial action objectives, proposed performance standards, all ARARs and action levels related to the proposed action, and an implementation schedule and completion date for the proposed action.

1.1 IM/IRA Format and Content

IM/IRAs are utilized for accelerated actions that will require more than six months for project execution and/or where the remedy is not straightforward and multiple alternatives have been evaluated. Alternative evaluation and selection are not necessary if a presumptive remedy has been selected. The suggested format for an IM/IRA is outlined below. In general, for actions where a formal alternatives analysis is performed, the IM/IRA will follow the format of EPA Guidance on *Conducting Non-time Critical Removal Actions Under CERCLA*, (August 1993.) The EE/CA process is one method of performing a streamlined alternatives development and screening, and should be the upper bound of complexity for the IM/IRA Document. The intent of this guidance is to allow the complexity of the decision document to be based on the complexity of the project.

If an alternatives analysis is performed, the first part of the IM/IRA should describe the project to be performed using the selected remedy. The second part of the IM/IRA should describe the remedy selection process, and explain which remedy was selected and why.

The sections of an IM/IRA should include:

- — Executive Summary (Optional)
- Purpose
- Project Description
- Project Approach
- Environmental Impacts
- Compliance with ARARs
- Implementation Schedule

The following sections are necessary if an alternatives analysis is performed:

- Initial Selection and Screening of Alternatives
- Analysis of Alternatives

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- Comparative Analysis of Alternatives and Remedy Selection
- Responsiveness Summary

The selected remedy will be described in the first part of the IM/IRA. The Responsiveness Summary will be included in either case.

1.2 EXECUTIVE SUMMARY

The Executive Summary provides a general overview of the contents of the IM/IRA and is recommended only for complex problems where special issues are involved and/or where a formal alternative evaluation is performed. The summary should include a brief description of the IHSS or site, the nature of the contamination and related risks (or exceedence of action levels) and scope and objectives of the proposed removal action/interim measure. If a presumptive remedy has been selected, a short statement of why the presumptive remedy is appropriate should be included. If an alternatives analysis was performed, a brief discussion of the alternatives considered and basis for selection of the preferred alternative should be provided. Depending on the length and complexity of the IM/IRA, the Executive Summary is optional.

1.3 INTRODUCTION

The introduction should briefly state:

- The nature of the contamination
- The proposed action
- The intent or goal of the proposed action

The introduction should state whether a presumptive remedy was selected, and why the remedy is appropriate (e.g., a similar remedy has been used in the past for similar contamination or type of problem). If an alternative analysis was performed, the introduction should state why a presumptive remedy was not selected (e.g., the setting or combination of contaminants, special hazards or other project-specific issues).

1.4 SITE DESCRIPTION

The site description will provide IHSS/site information including the contamination history, geological and hydrogeological conditions, remedial investigation data, and a brief summary of risks posed by the contamination and how the action mitigates those risks. If the action is based on exceedence of the RFCA Action Levels, discuss how the action addresses these exceedences. This section will also include a brief description of how the proposed action is consistent with any long-term remedial objectives. If appropriate, the following Background, General Conditions, and Data Summary subsections can be combined into one section: Existing Conditions and Conceptual Model.

1.4.1 Background

The background section will describe the nature and history of the contamination source. This may include historical information on spills or other releases, any waste operations associated with the contamination, and the relationship between the contamination and other IHSSs.

1.4.2 General Conditions

This summary describes the site-specific conditions or pertinent data to support the rationale for undertaking the action, such as the geological and hydrogeological conditions of the area to be remediated.

Only information relevant to the proposed action should be discussed. General discussions of the site geology, geographic setting, and other general physical characteristics should be referenced to existing documents, such as the site-wide geochemistry and hydrogeology reports.

1.4.3 Data Summary

This section summarizes past remedial investigations or any other available relevant data.

This would include, if relevant:

- Appropriate field investigations such as HPGe surveys, soil gas surveys, etc.
- Groundwater, surface water, soil and/or other relevant analytical results
- Field observations
- Waste disposal data and history
- Any other appropriate, available historical data

The information from the above sections may be presented in a plan view (map), a cross-section (if appropriate), tabular form, or narrative. Locations of relevant sampling points should be shown in relation to the site or area to be remediated. It is helpful to integrate the available data into a conceptual model showing the relationship of the contamination to groundwater, buildings and other structures, surface water, slopes, underground utilities, and other physical items that may impact the project execution.

1.5 PROJECT APPROACH

Proposed action objectives narrative and numerical remedial goals are described here. This should be a brief and concise statement of the intended objectives of the action. Remedial action objectives will include meeting specified cleanup targets for the media being remediated.

If an alternatives analysis was performed, briefly state here specifically what the selected remedy is, and the basis for selection. Refer to the following sections for details on how this remedy will be implemented. If no alternatives analysis was performed, address the reason that the No

Action Alternative was not selected (i.e., the site poses a risk, contaminants are above specified action levels, etc.).

1.5.1 Proposed Action

This section details the proposed action including the scope of the action, the proposed remediation methodology, cleanup levels, and site restoration. Where applicable, these details would include information on:

- The scope or extent of the action, including projected volumes of any environmental media to be removed and/or treated
- Excavation methods
- Material handling
- Groundwater or surface water containment and/or recovery methods
- Treatment methods for water, soils, sediments, debris, or other materials generated, including tabulated performance standards for treatment
- Transportation or staging requirements
- Any control measures to minimize the environmental impact of the proposed action (i.e., dust suppression, containment measures, surface water protection)
- Performance monitoring in accordance with the IMP
- Site restoration including any revegetation, backfilling, or regrading

Sampling and analysis requirements will be deferred to the project-specific SAP developed in accordance with the guidelines in Section 3.2 of the IGD.

1.5.2 Worker Health and Safety

This section will include a brief description of the basis for the health and safety requirements, the hazards, monitoring requirements, personal protective equipment (PPE), and actions to protect human health. Action-specific HASP and Hazards Analysis (HA) will be prepared separately.

1.5.3 Waste Management

This section will describe the storage requirements and final disposition of all waste streams that will be generated. Remediation wastes are defined in RFCA §25bf as:

Remediation waste means all:

- (1) Solid hazardous, and mixed wastes;
 - (2) All media and debris that contain hazardous substances, listed hazardous or mixed wastes that exhibit a hazardous characteristic;
- and

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- (3) *All hazardous substances generated from activities regulated under this Agreement as RCRA corrective actions or CERCLA response actions, including decommissioning.*

Remediation waste does not include wastes generated from other activities. Nothing in this definition confers RCRA or CHWA authority over source, special nuclear, or byproduct material as those terms are defined in the Atomic Energy Act.

1.6 NEPA

This section is included to identify how NEPA values are incorporated into the decision document. Ideally the NEPA values will be woven throughout the decision document so that they are considered at all phases of the decision making. This section provides an opportunity to reiterate how NEPA values may have been considered in other parts of the decision document, and to touch upon other NEPA values that may not have been directly addressed. The NEPA values to be considered include:

- Air quality during construction and operation of the project
- Water quality (including both surface water, wetlands, and groundwater and the flow characteristics of each)
- Flora and fauna (including threatened and endangered species)
- Historic and cultural resources
- Human health
- Consideration of alternatives including no action
- Irreversible and irretrievable commitment of resources
- Short-term versus long-term use of the proposed site
- Indirect effects
- Cumulative effects (effects from the current project added to the effects from other known projects affecting the same site)

1.7 COMPLIANCE WITH ARARS

This section consists of an analysis of Federal and State ARARs. Chemical-specific, location specific, and action-specific ARARs are identified and tabulated. Section 3.5 of the IGD discusses development and selection of ARARs.

1.8 IMPLEMENTATION SCHEDULE

This section will include a general schedule of when the project is to be implemented, including commencement of field activities and report generation. The format of the schedule will be

project-specific. Milestones will be presented at a summary level with nonspecific dates, e.g., "field activities will commence in the second quarter of 1999."

2.0 INITIAL SELECTION AND SCREENING OF ALTERNATIVES

Only a limited number of alternatives (two to four) need to be considered for the IM/IRA. Only the most qualified technologies and/or alternatives that apply to the chemicals of concern (COCs) and affected media need be considered. To the extent possible, presumptive remedies or previous actions for similar situations should be used as a basis for decisions. In these cases, the decision document should reference previous decision documents whenever possible, with the intent of minimizing decision processes.

Each of the alternatives should be discussed in sufficient detail so that the entire process can be understood. For example, treatment and/or disposal of residuals resulting from the remedy should be addressed.

The selected alternatives are evaluated for effectiveness, implementability, and cost. This evaluation is based on the scope of the IM/IRA and each of its specific objectives. The evaluation encompasses the criteria addressed in a full scale CMS/FS, but is done in a much more streamlined manner. The following discussion provides more detailed descriptions of each criterion. The EPA *Guidance on Conducting Non-Time Critical Removal Actions under CERCLA* (EPA, 1993) should be consulted for a description of the alternative screening and evaluation process.

2.1 EFFECTIVENESS

This criteria considers whether or not the alternative provides protection of public health and the environment. Long-term effectiveness, short-term effectiveness, and compliance with ARARs are evaluated for overall protection of public health and the environment.

Short-term effectiveness relates to the protection provided during implementation and before the IM/IRA objectives have been met. It addresses such items as impacts due to fugitive dusts, transportation of hazardous materials, and toxic fumes produced during implementation. Impacts on the local community, the workers implementing the action, and the environment are included.

Long-term effectiveness addresses the level of risk remaining after the action has been completed and the need for addition of controls. The degree to which the alternative reduces toxicity, mobility or volume of contamination and how this in turn reduces risk or potential threats is also discussed.

This section must summarize ARARs for the proposed IM/IRA action. The requirements should be presented as a summary table in the IM/IRA Decision Document, with a brief discussion in the text of this section. The alternatives evaluation will include a discussion, in general terms, of whether or not they can be complied with and what cost and schedule impacts pertain to each alternative. A detailed ARARs evaluation will be included elsewhere in the IM/IRA.

2.2 IMPLEMENTABILITY

This criteria addresses the technical and administrative feasibility of implementing an alternative and the availability of the services and materials required. Technical feasibility relates to the maturity and complexity of the technology being evaluated. Construction feasibility, and operations and maintenance requirements are also considered.

Administrative feasibility relates to the need for coordination with other offices and agencies, such as requirements for building permits, easements, or zoning variances. Availability of services and materials relates to the need for skilled labor/technicians to operate the technology/process, offsite treatment/storage/disposal, utilities, and laboratory services.

Finally, the implementability criteria includes a consideration of the acceptability of the alternatives to the State and local community.

2.3 COST

Evaluation of costs should consider the capital costs to engineer, procure, and construct the required equipment and facilities, and the operating and maintenance costs associated with the alternative. The cost estimates can be "order-of-magnitude" with sufficient accuracy to allow comparison and ranking of the alternatives on a present worth basis for alternatives that involve more than one year of operation and maintenance. For the alternative evaluation section of the IM/IRA, the alternatives will be compared on a qualitative basis using descriptors such as high, medium, or low.

The results of the analysis will be presented in the IM/IRA Decision Document for each alternative evaluated. This analysis will be summarized in a table similar to Table 2-1.

Based on the analysis, a decision will be made as to whether or not each alternative considered should be retained for the comparative analysis, which is discussed in the next section. The reason for eliminating an alternative should also be discussed.

Table 2-1 Initial Screening of Alternatives

EFFECTIVENESS

Protectiveness

Public Health

Workers

Environment

Attains ARARs

Achieve Remedial Objectives

Level of treatment/containment

No residual effect concerns

Maintains control until long-term solution implemented

IMPLEMENTABILITY

Technical Feasibility

Construction and operation

Demonstrated performance

Adaptable to environmental conditions

Need for permits

Availability

Equipment

Personnel and services

Outside laboratory testing

Offsite treatment and disposal

Post-removal site control

Administrative Feasibility

Permits required

Easements of right-of-ways required

Impact on adjoining property

Ability to impose institutional controls

COST

Capital Cost

Operation and Maintenance

Present worth cost

2.4 COMPARATIVE ANALYSIS OF ALTERNATIVES

Alternatives that pass the initial screening based on effectiveness, implementability, and cost are now compared against each other. At this point a remedy may be selected if there is an obvious benefit to a single remedy during the initial screening. The purpose of the comparative analysis is to identify the advantages and disadvantages of each alternative relative to one another so that one of them can be identified as the recommended action.

The actual comparison may be made on a semi-quantitative ranking system based on effectiveness, implementability and cost. After each category has been scored, a total score (low, medium, high) is obtained. The alternative with the highest score would probably be the recommended alternative, assuming that it is cost effective. Generally, a matrix indicating the relative scores of the alternatives and the justifications for the scores is the best method for presentation.

If there is no best alternative by this method, it may be necessary to add additional criteria and/or weighing factors to the criteria to differentiate between the alternatives.

2.5 RESPONSIVENESS SUMMARY

The approved responsiveness summary from the public comment period will be attached to the final approved IM/IRA.

3.0 GENERIC IM/IRA SCHEDULE

The attached generic schedule is for the development of an IM/IRA. Variations for each IHSS may influence the duration of specific activities. This schedule may be used as a planning basis.

4.0 COMMENT RESPONSIVENESS SUMMARY

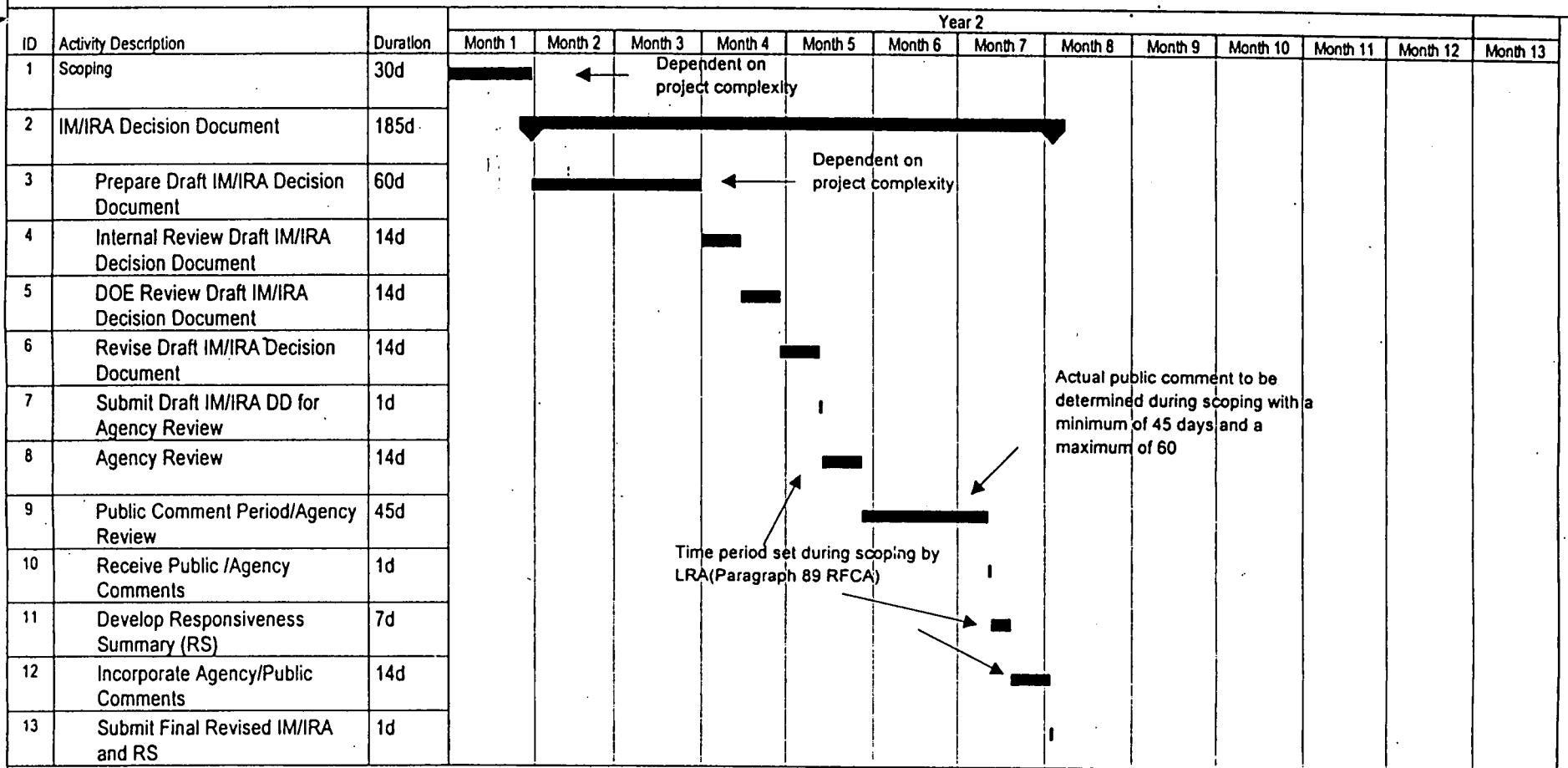
This section will be included to document responses to public and agency comments if a separate responsiveness summary is not created.

5.0 DECISION MODIFICATION PROCESS

The decision modification process for IM/IRAs is discussed in Section 3.10 of the IGD, and in Part 10 of the RFCA.

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Generic IM/IRA Schedule





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Appendix C

PREPARATION OF AN ER PROPOSED ACTION MEMORANDUM

APPENDIX C

1.0 PREPARATION OF AN ER PROPOSED ACTION MEMORANDUM

1.1 PAM FORMAT

RFCA ¶106 describes the PAM process:

The Draft PAM shall contain a brief summary of data for the site; a description of the proposed action; an explanation of how waste management considerations will be addressed; an explanation of how the proposed action relates to any long-term remedial action objectives; proposed performance standards; all ARARs and action levels related to the proposed action; and an implementation schedule and completion date for the proposed action.

The PAM is the decision document for accelerated response action requiring less than six months for project execution. The length and complexity of the PAM will depend on the complexity of the project. The development of the sections included in a PAM is discussed in the following sections.

The sections of a PAM include:

- Purpose
- Project Description
- Background
- Project Approach
- Environmental Impacts
- Compliance with ARARs
- Implementation Schedule
- Comment Responsiveness Summary

1.2 PURPOSE

This introduction briefly states:

- The nature of the contamination

- The proposed action
- The intent or goal of the proposed action

1.3 SITE DESCRIPTION

The project description provides site information including history, geological and hydrogeological conditions, remedial investigation data, a brief summary of risks posed by the site and how the action will mitigate the risks. This section will also include a brief description of how the proposed action is consistent with any long-term remedial objectives. If appropriate, the Background, General Conditions, and Data Summary subsections can be combined into one section entitled Existing Conditions and Conceptual Model. The section would contain the same information and integrate it into a conceptual model of the site, including known and expected contaminant distribution and factors expected to impact the project (e.g., shallow groundwater).

1.3.1 Background

The background section describes the nature and history of the contamination source. This potentially includes historical information on spills or other types of releases, any waste operations associated with the contamination, and the relationship between the contamination and other IHSSs.

1.3.2 General Conditions

This summary describes site-specific conditions or pertinent data to support the rationale for undertaking the action such as the geological and hydrogeological conditions of the area to be mitigated. Information relevant to the action may include:

- Underlying stratigraphy
- Depth to groundwater
- Saturated thickness
- Mean hydraulic conductivity and gradient
- Seasonal effects
- Any relevant information on seeps or surface water locations

Only information relevant to the proposed action should be discussed. General discussions of the site geology, geographic setting, and other physical characteristics should be referenced to existing documents.

1.3.3 Data Summary

This section summarizes past remedial investigations. This would include, if relevant:

- Geophysical survey information
- Borehole sampling results
- Groundwater sample results
- Surface water sample results
- Surface soil, sludge, or sediment sample results
- Field screening results
- Free product samples and thickness measurements
- Samples and smears from tanks and pipelines
- Field observations
- Any other appropriate, available historical data

1.4 PROJECT APPROACH

This section provides a brief and concise statement of the intended objective of the accelerated action.

1.4.1 Proposed Action Objectives

This section details the proposed action including the scope of the action, the proposed remediation methodology, cleanup levels, and site restoration. Where applicable, these details would include information on:

- The scope or extent of the action including projected volumes of any environmental media removed and/or treated
 - Excavation methods
 - Material handling
 - Groundwater or surface water recovery methods
 - Treatment methods for water, soils, sediments, debris, or excess equipment, including tabulated performance standards for treatment
 - Transportation or staging requirements
 - Any control measures to minimize the environmental impact of the proposed action, (e.g., dust suppression, and containment measures)
 - Performance monitoring in accordance with the IMP
-

- Site restoration including any revegetation, backfilling, or regrading

Discussion of sampling and analysis will be deferred to the project-specific sampling and analysis plan developed as per the guidelines in Section 3.2 of the IGD.

1.4.2 Worker Health and Safety

This section will include a brief description of the basis for health and safety requirements, the hazards, monitoring requirements, PPE, and actions to protect human health. An action-specific HASP will be prepared separately.

1.4.3 Waste Management

This section will describe the storage and management requirements and final disposition of all waste streams that will be generated. Remediation wastes are defined in RFCA ¶25bf as:

Remediation waste means all:

- 1) Solid hazardous, and mixed wastes;*
- 2) All media and debris that contain hazardous substances, listed hazardous or mixed wastes that exhibit a hazardous characteristic; and*
- 3) All hazardous substances generated from activities regulated under this Agreement as RCRA corrective Actions or CERCLA response actions, including decommissioning.*

Remediation waste does not include wastes generated from other activities.

Nothing in this definition confers RCRA or CHWA authority over source, special nuclear, or byproduct material as those terms are defined in the Atomic Energy Act.

1.5 NEPA

This section is included to identify how NEPA values are incorporated into the decision document. Ideally the NEPA values will be woven throughout the decision document so that they are considered at all phases of the decision making. This section provides an opportunity to reiterate how NEPA values may have been considered in other parts of the decision document, and to touch upon other NEPA values that may not have been directly addressed. The NEPA values to be considered include:

- Air quality during construction and operation of the project
- Water quality (including both surface water, wetlands, and groundwater and the flow characteristics of each)
- Flora and fauna (including threatened and endangered species)
- Historic and cultural resources
- Human health
- Limited consideration of alternatives including no action, as appropriate
- Irreversible and irretrievable commitment of resources
- Short-term versus long-term use of the proposed site
- Indirect effects
- Cumulative effects (effects from the current project added to the effects from other known projects affecting the same site)

1.6 COMPLIANCE WITH ARARS

This section consists of an analysis of federal and state ARARs. Chemical-specific, location-specific, and action-specific ARARs are identified and summarized in a table. Section 3.5 of the IGD discusses identification and evaluation of ARARs.

1.7 IMPLEMENTATION SCHEDULE

This is a general project schedule including commencement of field activities and report generation. The format of the schedule will be project-specific. Milestones will only be presented at a summary level with nonspecific dates (e.g., "field activities will commence in the second quarter of 1999"). The attached generic schedule for PAMs may be used as a starting point for project planning.

1.8 COMMENT RESPONSIVENESS SUMMARY

This section will be included if a separate responsiveness summary is not created. Written comments from the public comment process will be documented followed by responses to individual or group comments that have similar focus.

1.9 DECISION MODIFICATION PROCESS

The decision modification process for PAMs is described in Section 3.10 of the IGD.



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Appendix D

**PREPARATION OF AN RFCA STANDARD OPERATING
PROTOCOL DOCUMENT**

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APPENDIX D

1.0 PREPARATION OF AN RFCA STANDARD OPERATING PROTOCOL DOCUMENT

RFCA ¶25(b) defines a Rocky Flats Cleanup Agreement Standard Operating Protocol (RSOP). That paragraph states:

RSOP means approved protocols applicable to a set of routine environmental remediation and/or decommissioning activities regulated under this Agreement that DOE may repeat without re-obtaining approval after initial approval because of the substantially similar nature of the work to be done. Initial approval of an RSOP will be accomplished through an IM/IRA process.

1.1 EXECUTIVE SUMMARY

The Executive Summary provides a general overview of the contents of the RSOP. Depending on the length and complexity of the RSOP, the Executive Summary is optional.

1.2 INTRODUCTION

The introduction should briefly state:

- The purpose of the RSOP (define why the RSOP is needed and intent or goal of action)
- The proposed action (i.e., the scope of this RSOP)

1.3 PROJECT APPROACH

1.3.1 Proposed Action

This section provides a description of the proposed action including the scope of the RSOP, the proposed remediation methodology, cleanup levels, and site restoration. Where applicable, these details would include information on:

- Monitoring requirements during implementation of the RSOP
- The scope or extent of the action, including projected volumes of any process or remediation waste to be removed and/or treated
- How the proposed action relates to any long-term remedial action objectives

1.3.2 Worker Health and Safety

This section will include a brief description of the basis for the health and safety program or plan requirements, the hazards, monitoring requirements, PPE, and actions to protect human health. Action-specific HASP and HA will be prepared separately.

1.3.3 Waste Management

This section will describe the management requirements and final disposition of all waste streams generated other than the waste specifically addressed in this RSOP. (For example, secondary waste generated as a result of this activity.)

1.4 ENVIRONMENTAL CONSEQUENCES

This section is included to identify how NEPA values and potential environmental consequences are incorporated into the decision document. Ideally the NEPA values will be woven throughout the decision document so that they are considered at all phases of the decision making. This section will reiterate how NEPA values and potential environmental consequences of the activities may have been considered in other parts of the decision document, and to touch upon other NEPA values and potential environmental consequences that may not have been directly addressed. The NEPA values and potential environmental consequences to consider include:

- Soils and geology
- Air quality
- Water quality
- Human health and safety
- Ecological resources
- Historic resources
- Visual Resources
- Noise
- Transportation
- Unavoidable adverse effects
- Short-term uses versus long-term effects
- Irreversible and irretrievable commitments

1.5 COMPLIANCE WITH ARARS

This section consists of an analysis of Federal and State ARARs. Chemical-specific, location-specific, and action-specific ARARs are identified and tabulated. Section 3.5 of the IGD discusses development and selection of ARARs.

1.6 IMPLEMENTATION SCHEDULE

Once the regulatory agencies initially approve the RSOP, DOE RFFO may implement the RSOP throughout the duration of the Rocky Flats Closure Project. DOE RFFO will notify the regulatory agencies prior to implementing the RSOP for a specific-project. Project-specific approval by the regulatory agencies to use the RSOP is not required.

1.7 RESPONSIVENESS SUMMARY

The approved responsiveness summary from the public comment period will be attached to the final approved RSOP. (Alternatively, may include a section within the final RSOP to document responses to public and agency comments if a separate responsiveness summary is not included.)

1.8 ADMINISTRATIVE RECORD

This section will contain the Administrative Record file and proposed Administrative Record for this decision. After completion of the public comment period, all comments received from the public, the responsiveness summary and the approval letter will be added to the Administrative Record file. Approval of this decision document is approval by the regulators of the Administrative Record for the actions covered by the RSOP.



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Appendix E

NO FURTHER ACTION DEVELOPMENT SCHEDULE

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GENERIC NFA SCHEDULE

ID	Task Name	Duration	Week 1			Week 2			Week 3			Week 4			Week 5			Week 6			Week 7			Week 8			Week 9			Week 10			We							
			1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71		
1	Prepare NFA Documentation	14d																																						
2	Submit NFA to HRR	3d																																						
3	Prepare HRR for Annual Agency Submittal	7d																																						
4	Submit HRR to Agencies	1d																																						
5	Agency Review	21d																																						
6	Recieve Agency Comments	1d																																						
7	Resolve Agency Comments	7d																																						
8	Revision	7d																																						
9	Submit to Agencies for Approval	1d																																						
10	Agency Approval for Release	7d																																						

Project: Generic NFA Schedule

Task

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Appendix F

ENVIRONMENTAL DATA MANAGEMENT

APPENDIX F

1.0 CLOSURE DATA MANAGEMENT

A variety of data will be generated during Closure. These data include, but are not limited to:

- Air monitoring data
- Meteorological data
- Ecological data
- Surface water monitoring data (including physical and chemical information)
- Groundwater monitoring data (including analytical and field parameters)
- Well construction data
- Geological information
- Spatial data
- Waste characterization data
- Field instrument data
- Soils data (analytical and physical data)
- Other characterization data (including HPGe field data)

The main types of environmental data collected during the Closure process are graphically shown in Figure F-1. These data are vital to successful 2006 Closure and must be collected, stored, managed, and used appropriately to support Closure decision-making and regulatory Closure via the CAD/ROD. The data must be of sufficient quality to support decisions, managed in a manner that allows repeat use, and secured for both required recordkeeping and provision of data to final Site stewards. The requirement of future availability and repeat use dictates that data are stored centrally using consistent and easily identifiable titles and labels. **This management is the responsibility of the Closure Operations group with support and infrastructure provided by the Closure Support Group.**

The following sections outline specific Closure data management and quality requirements for all projects conducted under RFCA.

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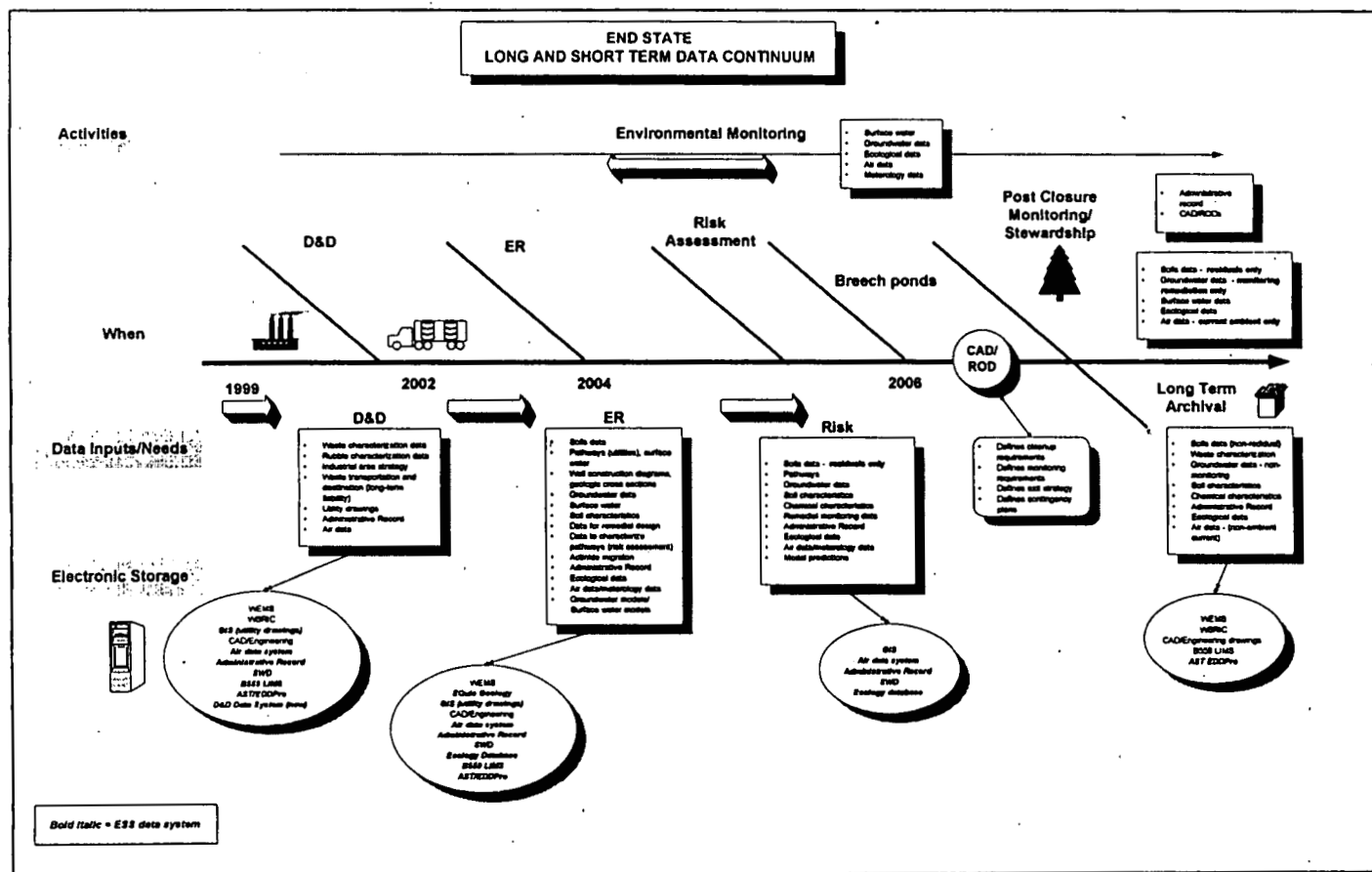


Figure F-1 Main Types of Environmental Data Collected During Closure Process

1.1 ENVIRONMENTAL DATA QUALITY AND USABILITY

Environmental data quality is a multi-step process that ensures the data collected at part of RFCA projects are sufficient for their intended use. In most instances, analytical data collected in support of a SAP should be evaluated using the guidance described in the Rocky Flats Administrative Procedure 2-G32-ER-ADM-8.02, *Evaluation of ERM Data for Usability in Final Reports*. This procedure establishes the guidelines for evaluating analytical data with respect to the PARCC parameters, which address the overall quality of the data collected and their usability by the project for decision making. The PARCC process and analytical data quality assessment process are discussed in the following sections.

1.1.1 PARCC Process

The definition of PARCC parameters and the specific applications to the investigation are as follows:

Precision A quantitative measure of data quality that refers to the reproducibility or degree of agreement among replicate or duplicate measurements of a parameter. The closer the numerical values of the measurements are to each other, the lower the relative percent difference and the greater the precision. The relative percent differences (RPD) for results of duplicate and replicate samples will be tabulated according to matrix and analytical suites to compare for compliance with established precision DQOs. Deficiencies will be noted and qualified, if required. Evaluation of precision encompasses an evaluation of the sample collection process as well.

Accuracy A quantitative measure of data quality that refers to the degree of difference between measured or calculated values and the true value of a parameter. The closer the measurement to the true value, the more accurate the measurement. The actual analytical method and detection limits will be compared with the required analytical method and detection limits for VOCs and radionuclides to assess the DQO compliance for accuracy.

Representativeness A quantitative characteristic of data quality defined by the degree to which the data absolutely and exactly represented the characteristics of a population. Representativeness is accomplished by obtaining an adequate number of samples from appropriate spatial locations within the medium of interest. The actual sample types and quantities will be compared with those stated in the SAP or other related documents and organized by media type and analytical suite. Deviation from the required and actual parameters will be justified, as required.

Completeness A quantitative measure of data quality expressed as the percentage of valid or acceptable data obtained from a measurement system. A completeness goal of 90% has been set for SAPs. Real samples and QC samples will be reviewed for the data usability and achievement of internal DQO usability goals. If sample data cannot be used, the non-compliance will be justified, as required.

TABLE F-1 PARCC PARAMETER SUMMARY

PARCC	Radionuclides	Non-Radionuclides
Precision	Duplicate Error Ratio ≤ 1.42	
Accuracy	Detection Limits per method and ASD Laboratory SOW	Comparison of Laboratory Control Sample Results with Real Sample Results
Representativeness	Based on SOPs and SAP	Based on SOPs and SAP
Comparability	Based on SOPs and SAP	Based on SOPs and SAP
Completeness	90% Useable	90% Useable

Comparability A qualitative measure defined by the confidence with which one data set can be compared to another. Comparability will be attained through consistent use of industry standards (e.g., SW-846) and standard operating procedures, both in the field and in laboratories. Statistical tests may be used for quantitative comparison between sample sets (populations). Deficiencies will be qualified, as required. Quantitative values for PARCC parameters for the project are provide in Table F-1.

1.1.2 Analytical Data Assessment Process

RFETS Analytical Services group provides analytical data assessment on all environmental data collected to support the Closure Mission. Data usability shall be performed on laboratory validated data according to procedure 2-G32-ER-ADM-08.02, *Evaluation of ERM Data for Usability in Final Reports*. The RFETS environmental data assessment process is outlined below.

Data Assessment

As shown in Figure F-2, all analytical data generated in conjunction with environmental activities at Rocky Flats are assessed to evaluate the performance of analytical laboratories with respect to contract requirements for quality. Data Assessment is a generic term for a quality assurance evaluation of analytical chemistry data. This assessment involves:

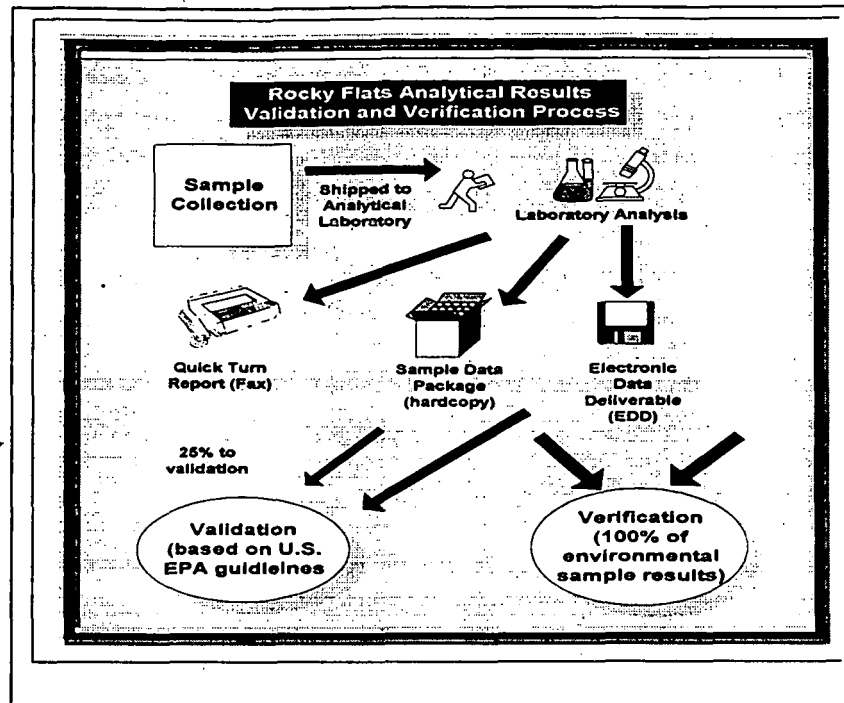


Figure F-2 Rocky Flats validation and Verification Process

- **Initial review** of the data package by the laboratory performing the analysis.
- **Cursory examination** of the data by Rocky Flats Analytical Services Division (ASD) Personnel prior to customer release of preliminary data .
- **Verification** of data packages in accordance with Rocky Flats Verification and Validation Guidelines. Verification is an assessment process to ensure data meets specified contractual data quality requirements. The verification process employed on environmental data serves as a comprehensive quality control assessment with the exception of raw data review and calculation checks. This level of assessment includes a random comparison of hard copy results against the electronic data deliverable (EDD). Validation of a selected percentage of the data packages from all laboratories serves as a check to determine if any systematic reporting or calculation problems exist, and may be applicable to those data packages that receive data assessment at the verification level. Current guidelines require 75 percent of the environmental data are verified.
- **Validation** of data packages in accordance with Rocky Flats Verification and Validation Guidelines. Validation is a comprehensive examination of a data package to determine compliance to data quality requirements, to ensure raw data supports reported values, and to evaluate the laboratory's compliance to subcontract reporting and deliverable requirements. This level of assessment includes a complete comparison of EDD data with data reported on the

hardcopy sample data package. Current guidelines require 25 percent of the environmental data are validated in accordance with *General Guidelines for Data Verification and Validation - DA-GR01-V1* (December 3, 1997). Additional details on the RFETS analytical data assessment process are found on the RFETS Intranet at http://rfetshp/Analytic_Services/dataq.htm

All analytical laboratories supporting the RFETS Closure Mission are routinely audited to ensure performance in accordance with contract specifications.

ASD also provides results for a majority of environmental analysis via an EDD, which includes information on the results of the data validation/verification process. The EDDs are designed for import into site environmental data systems to support further analysis and interpretation of the data.

Projects collecting and reporting non-laboratory data, such as field parameters, geologic logging, ecological sampling, etc, are required to follow and document adherence to Site and program specific QA/QC procedures.

1.2 ENVIRONMENTAL DATA MANAGEMENT

Appropriate management of RFETS environmental data is essential to Closure and a key responsibility of project managers conducting RFCA Closure projects. The majority of environmental data are available electronically and are stored in shared data systems. Each of these systems has been reviewed and tested for Y2K compliance and have been approved for operation for the remainder of the Closure Mission. Current environmental data systems are shown in Table F-2.

Most environmental data systems have been upgraded in the last year and several are scheduled for upgrade during FY00. Once upgrades are complete, all environmental data systems will be in a common site standard platform to facilitate integration of data and information among media.

Projects that collect Closure environmental data are required to store their data in the applicable database. In this way, such data will be easily available for secondary uses, as well as available in the future, long after the original project is completed and closed out. This relieves the RFCA project manager from long-term data management requirements beyond Site-required record keeping requirements. All data entered into environmental data systems must have a location and sampling event identified in accordance with Closure Project protocols.

TABLE F-2 CURRENT DATA SYSTEMS AT RFETS

Environmental Data System	Platform in FY00	Typical Data
Air Monitoring System Database (AMSD)	Oracle	Effluent air, ambient air, meteorology
Soil Water Database (SWD)	Oracle	Soil, groundwater, surface water, HPGe, water levels, field parameters, flow
Flow	Oracle	Surface water flow
Ecology Database (SED)	Access (later migration to Oracle)	Ecological species, soil types, sampling locations
Administrative Record (AR)	FileMaker (migration to Oracle and web enabled)	Index of administrative record documents
Integrated Sitewide Environmental Data System (ISEDS)	Oracle/access - web enabled	"raw" analytical data, electronic field measurements, interpreted data sets "residual" data sets
Geographic Information System (GIS)	ArcInfo	Spatial data
Analytical Services Toolkit (AST)/EDDProPlus (BIG EDD)	Access/Oracle	Laboratory analyses tracking, electronic laboratory analyses (EDD)
Waste Stream and Residue Identification and Characterization (WSRIC)	Oracle	Waste characterization
Waste Environmental Management System (WEMS)	Oracle	Waste container tracking

Figure F-3 shows a roadmap of requirements on where to direct environmental data collected during closure activities. Additional details on requirements are presented in the following paragraphs.

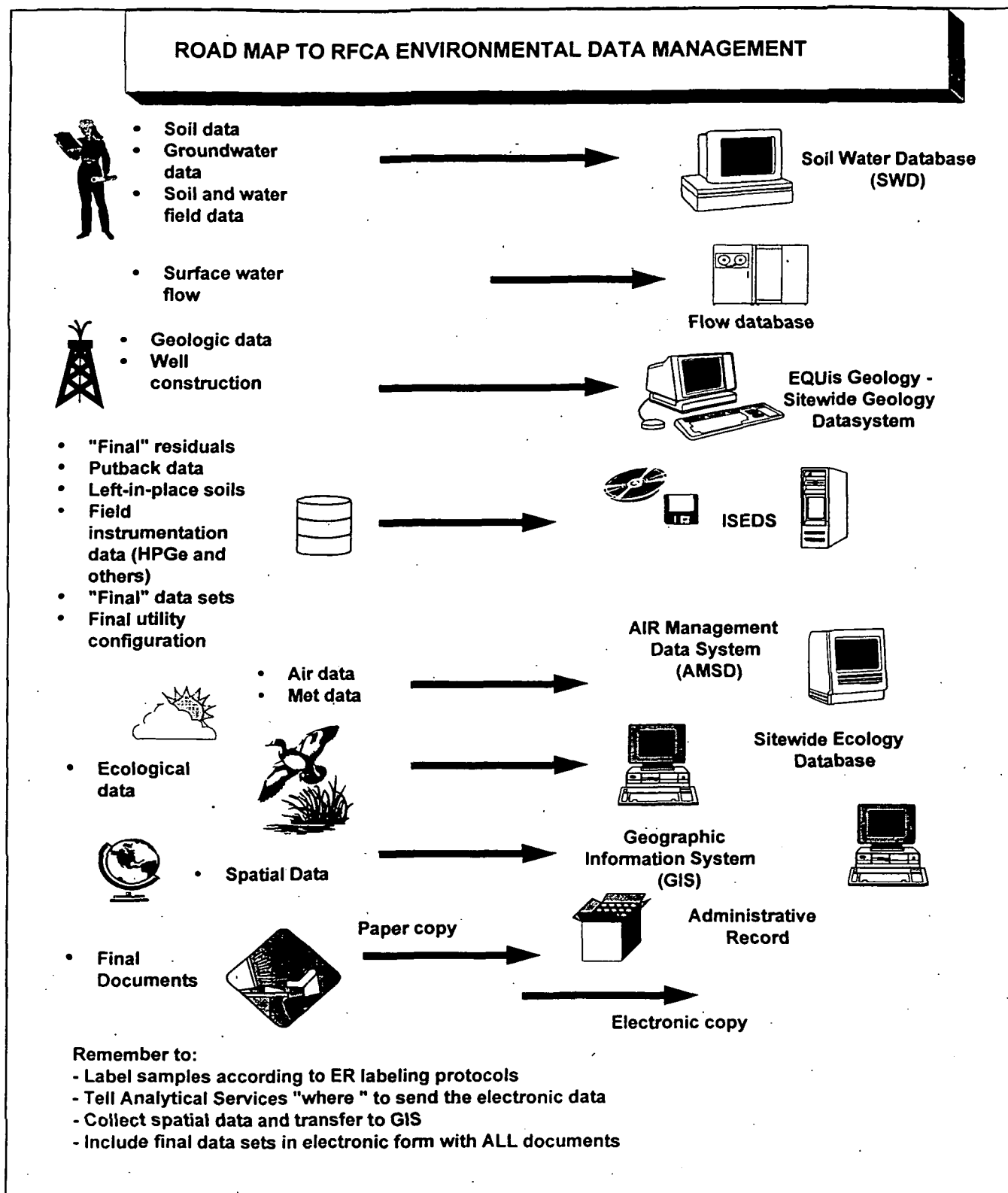


Figure F-3 Road Map to RFCA Environmental Data Management

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- **Interpreted Data files** - Each project generates a set of SME- interpreted data to justify the decision. Effective immediately, each project is required to include with each final decision document a copy of the interpreted data set in electronic form. Final interpreted data sets include all spatial data associated with a project. This will ensure that regardless of data management practices, the Site will possess the appropriate data to prepare the CAD/ROD. Kaiser-Hill managers will not consider a document "complete" without the attached electronic data file.
- **"Raw" Soil, groundwater, and surface water analytical data** - all analytical data collected to support ER projects will be entered into the Soil Water Database (SWD)
- **Soil and groundwater field Data** - all soil and groundwater field data collected to support ER projects will be entered into the SWD.
- **Surface water flow data** - all surface water flow data will be transferred to the FLOW database - contact Marian Carr x4488.
- **HpGe data and other field instrument data**- all electronically generated HpGE data and other field instrument data to support site characterization are to be stored in ISEDS, contact Marian Carr x 4488.
- **Air data** - all air data (including field parameters) will be transferred to the Air Management System Database (AMSD) database - contact Carol Patnoe x 2440.
- **Geologic and well construction data** - all geologic and well construction data will be transferred to RMRS, Steve Singer x 3387, for inclusion in the Sitewide EQUIS geologic data base.
- **Spatial Data (GPS)** - projects will collect appropriate spatial data for all important samples during characterization, remediation and closure. At a minimum, all "final characterization" data of any residuals left on Site, will be identified by both a spatial coordinate (X,Y,Z) and a standard location name in accordance with ER location naming conventions. Spatial data will be managed in coordination with the processes and procedures established by the RMRS GIS system (Wendell Cheeks x 7707).
- **Verification Soil Sampling** - Any verification soil sampling collected to demonstrate the satisfaction of performance objectives will be formally transferred for incorporation into Integrated Sitewide environmental data system (ISEDS). Similarly, where treated or untreated soil has been stockpiled and sampled prior to returning the soil to an excavated location (putback), any sample results representative of the stockpile, and thus representative of the returned soil, must be identified and incorporated into ISEDS. Project managers are responsible for providing sufficient information on each data set including accurate location information and data quality information. **Verification soil sampling data sets are vital to the final**

CAD/ROD and improper management of these data can lead to both delayed closure and increased costs in the out-years.

- **Stockpile Sampling** - Where treated or untreated soil has been stockpiled and sampled prior to returning the soil to an excavated location (putback), any sample results representative of the stockpile and thus representative of the returned soils, must be placed in the SWD database. Similarly, where treated or untreated soil has been stockpiled and sampled prior to management in a location different from the excavated location, any sample results representative of the stockpile, and thus representative of the soil at the new location, must be included in SWD with the new location information
- **D&D Characterization Data** - to be managed by the D&D program in accordance with established procedures.
- **Ecological Data** - all ecological data are to be managed in the Site Ecology database - contact Steve Nesta x 6386

1.3 Public Dissemination of Environmental Data

During FY99, data specified in the IMP will be provided to regulators as requested. To support this data transfer effort, the Integrated Site-wide Environmental Data System (ISEDS) and the Environmental Data Dynamic Information Exchange (EDDIE) were developed. A simplified overview of ISEDS/EDDIE operations is shown on Figure F-4.

All projects collecting and reporting data collected as part of the IMP, including Special Projects, are required to provide final documents and deliverables in electronic form (both text and final data sets) to the EDDIE administrator (x4488) for posting on EDDIE or data storage in ISEDS. Regulators will be able to obtain environmental data sets on ISEDS while public stakeholders will be able to access and download approved environmental reports from EDDIE via the world wide web. All submissions can be made via email.

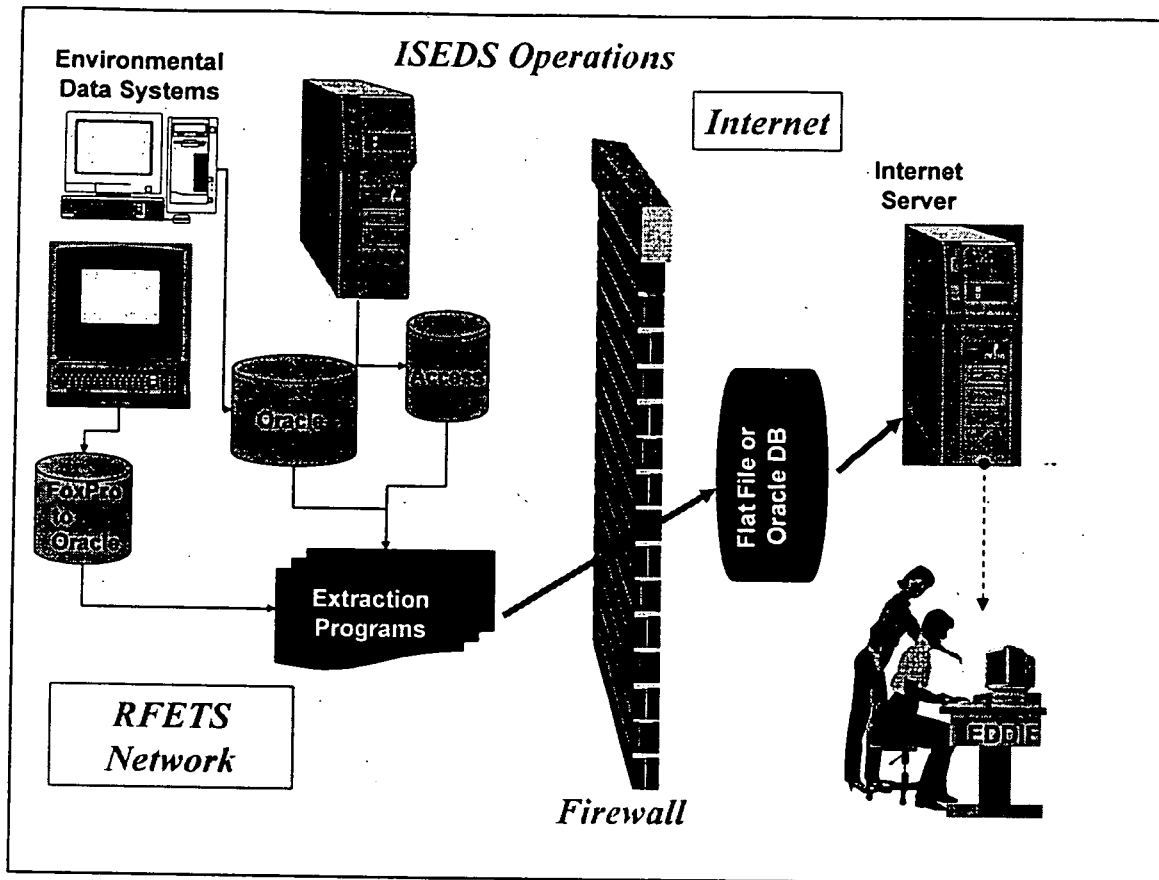


Figure F-4 Overview of ISED/EDDIE Operations



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Appendix G

PROPOSED PLAN AND CAD/ROD SCHEDULE

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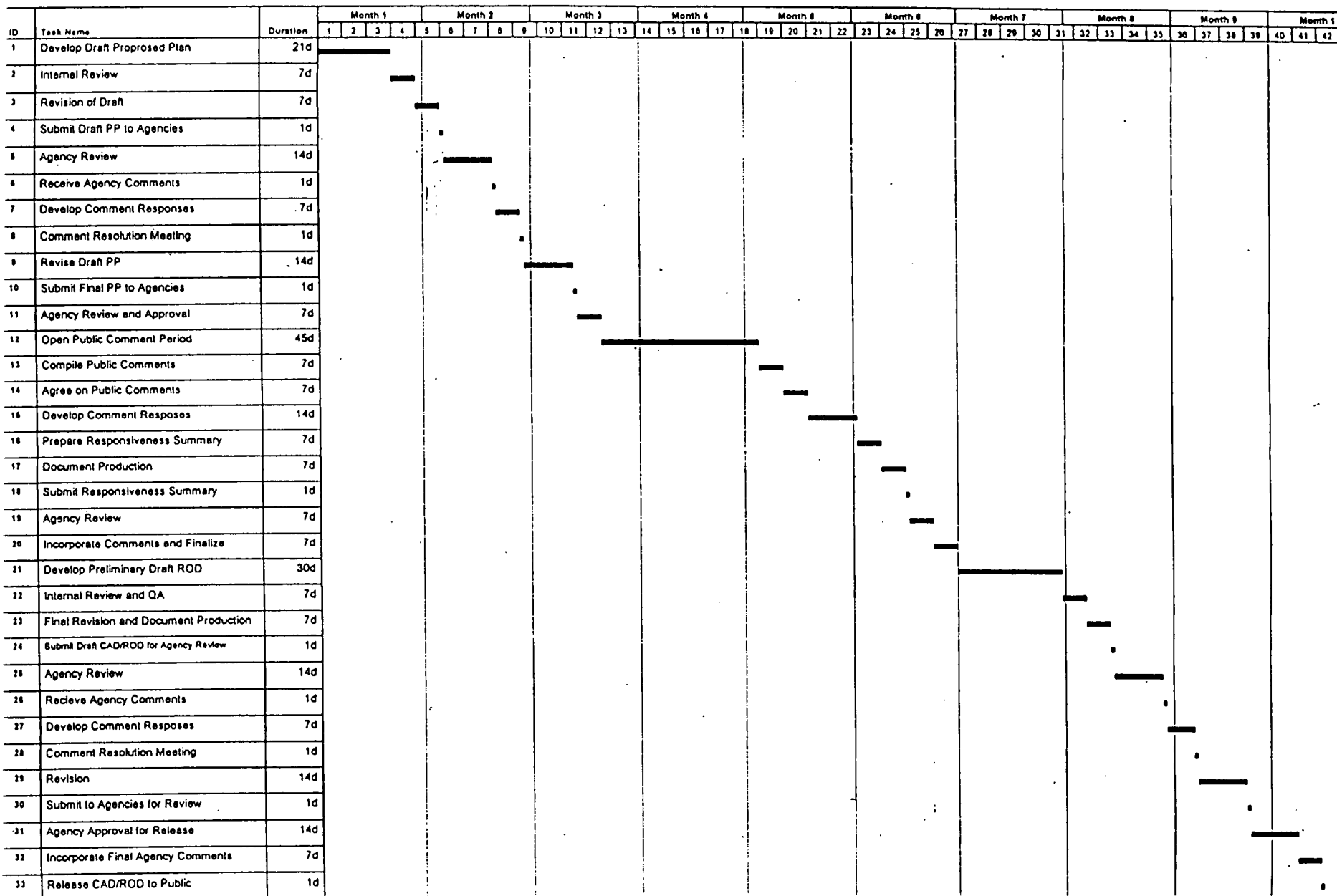
APPENDIX G

1.0 PROPOSED PLAN AND CAD/ROD SCHEDULE

Appendix F includes a generic schedule for the development of a PP/CAD/ROD. While actual activity durations may vary according to the complexity of the IHSS. This schedule may be used for planning purposes.

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GENERIC CAD/ROD SCHEDULE





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Appendix H

**GENERIC RCRA FACILITY INVESTIGATION/REMEDIAL
INVESTIGATION SCHEDULE**

APPENDIX H

1.0 GENERIC RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION SCHEDULE

Contents

The contents of an RFI/RI Report may include, but is not limited to the following:

- Description of the IHSS
- A summary of all field activities
- Presentation of all field data
- Location and characteristics and source(s) of contamination
- Definition on nature, extent, fate, and transport of contaminants
- Identification of sources which impact surface water
- Evaluation of risks

A generic schedule for the development of an RFI/RI Report is included. While actual activity durations may vary according to the complexity of the IHSSs, this schedule may be used for planning purposes.

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GENERIC RFI/RI SCHEDULE

ID	Task Name	Duration	Month 1	Month 5	Month 9	Month 13	Month 17	Month 21	Month 25	Month 29
1	Develop RFI/RI Work Plan	30d								
2	Internal Review	14d								
3	Recieve Comments	1d								
4	Revise Workplan	7d								
5	Submit to Agencies for Review and Comment	1d								
6	Agency Review	14d								
7	Recieve Agency Comments	1d								
8	Resolve Agency Comments	14d								
9	Revise Workplan	14d								
10	Submit Workplan for Approval	1d								
11	Agency Review and Approval	7d								
12	Prepare for Fieldwork	90d								
13	Perform Fieldwork	60d								
14	Recieve Analytical Results	0d								
15	Develop RFI/RI Report and HHRA	90d								
16	Preliminary Review RFI/RI Report	14d								
17	Revise Preliminary Draft	21d								
18	Document Production	114d								
19	Submit RFI/RI Report for Agency Review	1d								
20	Agency Review	30d								
21	Develop Comment Responses	14d								
22	Submit Comment Responses to Agencies	1d								
23	Agency Review of Comment Responses	14d								
24	Revise RFI/RI Report	30d								
25	Document Production	14d								
26	Submit Final RFI/RI to Agencies	1d								

Project: Generic RFI/RI Schedule

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Appendix I

OUTLINE OF SAMPLING AND ANALYSIS PLAN

APPENDIX I

1.0 OUTLINE OF SAMPLING AND ANALYSIS PLAN

The following SAP outline is based on *Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA* (EPA, 1988a) and reflects current RFETS usage. Each SAP will vary, however, depending on the data and sample requirements; SAPs will generally include information on the following topics:

- Background information
- Sampling rationale
- DQOs
- Sampling activities and methodology
- Data management
- Project organization
- Health and Safety Plan
- Quality Assurance
- Schedule

These outline topics are described in the following sections.

2.0 INTRODUCTION

The introduction will provide a brief project background and description including:

- Purpose/objectives of the SAP
- History of the site to be sampled (identify IHSSs, PACs or RCRA units in the area)
- Summary of existing data with an assessment of its adequacy
- Description of the Project including planned field activities
- Hydrogeologic setting (if appropriate to the project).

3.0 BACKGROUND INFORMATION AND SAMPLING RATIONALE

This section will discuss the reasons and justification used to develop sampling factors such as number of samples, location, depths, frequency, COCs, and analytical methods. Conditions of the physical setting which influence these factors can also be discussed.

This section should typically include a brief conceptual model to identify and document the potential field conditions, factors that may impact sampling results, and potential for free product to be present. The conceptual model is intended to show how the site works physically and chemically in terms of expected conditions. The model may be presented as cross-section of the contaminant distribution and potential transport mechanisms or items, structures, and physical conditions that may impact the project (e.g., presence of drums, depth to bedrock, depth to groundwater, steep slopes, location of surface water).

4.0 DATA QUALITY OBJECTIVES

The DQO process, as described in Section 3.2, is a structured decision-making process that requires the identification of and agreement on decisions for which data are required. The process results in the full set of specifications needed to develop a protective and compliance sampling program (i.e., qualitative and quantitative statements that specify the type, quality, and quantity of the data required to support decision making). The formal DQO process is documented in two EPA documents (EPA, 1993; EPA, 1994). Specific steps in the DQO process include:

- Identify and define problem(s) to be solved
- Identify decision(s) to be made relative to the problem
- Identify inputs to the decision (data needed to make decision)
- Define study boundaries/scope of problem and decision
- Develop decision rule(s) [IF/THEN action statement(s)]
- Specify limits on decision errors (acceptable types and degrees of uncertainty)
- Develop and optimize design for obtaining data

These steps are described below.

4.1 The Problem

Implementation of a sampling plan requires identification and disposition of contaminated media, materials, and equipment that were produced in past processes, especially relative to free

release (of materials) or management of particular waste types or streams. Adequate samples must be taken to properly characterize and manage the materials and/or equipment, whether it is waste or not.

Other decisions or subdecisions that support final project actions may be put forth in the form of following questions, provided that the answers or conclusions relate directly to project decisions, e.g:

- Why perform this characterization
- What is the final disposition of the material, equipment, facility, or structure (free release, restricted use, low level waste, etc.)

4.2 The Decisions

The critical technical decisions for a typical project are as follows, understanding that decisions may vary relative to goals of the project:

- What materials (e.g., paint, concrete, pipe insulation, etc), media (e.g., soil, water, oil, solid, sludge, etc), or equipment within the facility or area are contaminated or, conversely, not contaminated
- What are the generic classification categories by which the materials, equipment, and/or media will be managed, relative to an eventual assignment as contaminated (hazardous, radiological, or mixed) or not contaminated (nonhazardous)? In other words, what are the categories of waste streams that will result from the activity? What are the ultimate dispositions (i.e., waste classifications and treatment, storage, and disposal [TSD] facilities) of the waste streams, including quantities (e.g., a completed summary table)

4.3 Inputs to the Decisions

Inputs to the decisions are data, both qualitative and quantitative. Qualitative information will typically consist of nominal data (e.g., paint color, texture, or equipment type, etc) derived from visual observation of the building's equipment and materials. Quantitative data may be produced from analytical, radiochemistry, radiation surveys or petrographic analysis (asbestos) of samples. Waste Acceptance Criteria (WAC) are typically the drivers for decision inputs where data will be used to characterize waste streams destined for a particular TSD facility (e.g., NTS, Envirocare or USA waste). Inputs to the decisions are COC-specific.

Inputs to the decision must also include, directly or in other subsections, the following:

- Analytical/radiochemistry results
- Radiation survey results
- Method-specific sensitivities (detection limits or minimum detectable activities)
- Error tolerances associated with the measurements (e.g., accuracy and precision)
- Action levels (regulatory thresholds)

Although professional judgment is instrumental, sampling must err to the conservative (i.e., collecting more samples) if there is any doubt regarding homogeneity of the materials sampled.

Other decisions or subdecisions that support final project actions may be put forth in the form of following questions, provided that the answers or conclusions relate directly to project decisions:

- What information is required to make this decision
- What source(s) can be used to obtain the information
- Can the desired analysis be done at RFETS or will the samples be shipped off-site for analysis
- What types and kind of sampling measurements are required
- What type of instrumentation is required
- Has facility structural data been reviewed
- What suspect materials have been identified
- What are the required instrumentation sensitivities
- What method will be used to obtain the desired information
- What Quality Assurance (QA) program requirements are there for these samples (i.e., blanks, duplicates)
- What number of samples/measurements will provide the desired certainty
- Have data quantity and quality control requirements for sampling been reviewed

4.4 Project Boundaries

Project boundaries describe the geographic, three-dimensional areas, and temporal boundaries of the characterization activity. Other decisions or subdecisions that support final project actions may be put forth in the form of following questions, provided that the answers or conclusions relate directly to project decisions:

- What is the sample population of interest
- Are there any constraints on data collection

4.5 Decision Rules and Error Limits

Decision rules must be based on objective, reproducible, and verifiable, measurable criteria. If the decision is statistically based, decision error must address both the producer's (alpha) error and the consumer's (beta) error. "False Positive" error is usually equivalent to the alpha error while the "false negative" is equivalent with beta error, although this determination hinges on the way in which the hypothesis test is setup. Alpha and beta error typically range from 1% to 10% (i.e., confidences from 99% to 90%, respectively), based on standard statistical practice and historical acceptance by the regulators (public, CDPHE, and EPA Region VIII).

Decisions may also be based directly on protocols promulgated by the regulators, for example determination of asbestos. Other decisions or subdecisions that support final project actions may be put forth in the form of the following questions, provided that the answers or conclusions relate directly to project decisions.

- What is the basis for the decision
- Are there any regulatory and statistical drivers for sampling frequency
- What action levels are applicable to the discussion or parameter of interest
- Define the discussions using "If ... then ..." statements (e.g., if paint containing >50 ppm PCBs is identified then all resulting waste material will be handled as TSCA waste)

4.6 Optimization of Design

Modifications to the DQOs are typically based on visual observations, new information revealing data gaps as the project progresses, and professional judgement, all of which are documented and are discussed in the Data Quality Analysis section of the final report.

Acquisition of a sample directly depends on the sampling team's observations of the material, equipment, equipment components, or media of interest. If data gaps are identified subsequent to the characterization sampling and decisions described herein (i.e., the decision can not be made with confidence), additional sampling of source materials and/or waste streams will be conducted.

Analytical data collected in support of specific projects will be evaluated using the guidance established by the Rocky Flats Administrative Procedure 2-G32-ER-ADM-08.02, *Evaluation of ERM Data for Usability in Final Reports (RMRS 1994e)*. This procedure establishes the guidelines for evaluating analytical data with respect to PARCC parameters. Data validation will be performed according to the RFETS, Analytical Services Division (ASD) procedures and will be done after the data are used for their intended purpose.

5.0 SAMPLING ACTIVITIES AND METHODOLOGY

This section describes what information sampling methodology and the locations. Figures may be provided in the SAP for clarity, and available information may be presented about the samples, including:

- Number of samples in each media
- Grid spacing or sample location
- Sample depths
- Criteria for selection of additional samples
- Sample numbering
- Type and frequency of QA/QC samples
- Sample analysis (method numbers)

For each medium, describe the above information in the text and, as appropriate, provide a table enumerating the samples to be collected, rationale for each sample, analysis method (and method number), amount and types of QC samples, the type of container, preservative, and holding time. These tables should include project requirements and collection locations, where appropriate. The overall QA/QC requirements including field duplicates and blank samples analytical detection limits, and standards for accuracy and completeness are provided in the IMP. Sample handling, including chain-of-custody and packaging procedures, should be performed according to ER procedure 4-B29-ER-OPS-FO.13 *Containerization, Preserving, Handling and Shipping of Soil and Water Samples (RMRS, 1994c)*.

This section should briefly describe of how samples will be numbered and labeled in the field. Sample numbers are assigned by the SWD or ASD. It is strongly recommended that sample numbers be obtained from SWD and included in the SAP. Numbers from the assigned block of samples will be assigned if additional samples are needed. If only field-screening data will be collected, describe a systematic method that will be used to number sample locations, depths and analytical results.

6.0 DATA MANAGEMENT

A project field logbook should be created and maintained by the project manager or designee in accordance with site Procedures 2-S47 ER-ADM-05.14, *Use of Field Logbooks and Forms (RMRS 1995b)* and 4-B29-ER-OPS-FO.14 *Field Data Management (RMRS, 1994d)*. The logbook should include time and date of all field activities, sketch maps of sample locations, or any additional information not specifically required by the SAP. The originator should legibly sign and date each completed original hard copy of data. Appropriate field data forms should also be utilized when required by operating procedures that govern the field activity. Sample designations will appear in the logbook and on the field data forms. A peer reviewer should examine each completed original hard copy of data. Any modifications will be indicated in ink, and initialed and dated by the reviewer. Logbooks will be controlled through RMRS Document Control.

Analytical data record storage for this project will be performed by ASD. Sample analytical results will be delivered directly from the laboratory to the APO in an Electronic Data Deliverable (EDD) format and archived in the SWD. Hard copy records of laboratory results will be obtained from the APO in the event that the analytical data is unavailable in EDD or SWD at the time of report preparation. Analytical results will be compiled into a sampling and analysis results report. Additional data management discussion is provided in Section 3.4 of the main text.

7.0 PROJECT ORGANIZATION

If the SAP is not part of a document which already includes a project organization section, it should be described here. An organization chart should be included, at a minimum, that will include the project manager, sample team lead, and the appropriate quality assurance and safety personnel.

8.0 HEALTH AND SAFETY PLAN

The HASP used to control work should be referenced. In addition to the site-wide HASP, a project-specific HASP will usually have been developed for the PAM or IM/IRA being implemented. If only sampling activities are to be performed, a separate HASP may be needed to cover the activity.

9.0 QUALITY ASSURANCE

This section is based on implementing the site-wide Quality Assurance Project Plan to address the project-specific quality requirements, including the following elements:

- The 10 DOE quality criteria (Per DOE Order 5700.6C or 10 CFR 830.120) and including relevant parts of ANSI/ASQC E4 as applicable
- Sampling method, including specialized or specific equipment or instrumentation
- Collecting Decision logic for fewer or greater numbers of samples than those specified in the SAP
- QC sample types and quantities
- Specific analytical and/or radiochemistry methods and method numbers (e.g., SW-846, ASTM, (ANSI) American National Standards Institute, (ASQC) American Society of Quality Control, (ASTM) American Society of Testing and Material, etc)
- Sample management requirements, including preservation, chain of custody, and shipping
- Data management and reduction requirements, including hardcopies and digital data (See Appendix F, Environmental Data Management.)
- Modeling of software/hardware verification/validation

10.0 REFERENCES

Provide the references used to generate the SAP, if appropriate. This will include documents used to develop the background and site descriptions.



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Appendix J

**CORRECTIVE MEASURES STUDY/FEASIBILITY STUDY
PREPARATION**

APPENDIX J

1.0 CORRECTIVE MEASURES STUDY/FEASIBILITY STUDY PREPARATION

The CMS/FS report summarizes the results of the RFI/RI and the baseline risk assessment. Based upon that summary, risk and ARARs-based narrative remedial action objectives and where appropriate numeric remedial action goals are developed. Based upon the statement of objectives and goals, technologies are identified and evaluated for feasibility, screened against the criteria enumerated in the NCP, and ultimately compared one against another.

A suggested outline for the development of the CMS/FS is discussed in the following sections. It must be understood that the remedial action objectives control the types of technologies and process options considered.

The sections of a CMS/FS include:

- Executive Summary
- Introduction
- Site Characteristics
- Corrective/Remedial Action Objectives
- Identification and Screening of Alternatives
- Detailed Analysis of Alternatives
- Selected Alternative (Optional)

1.1 EXECUTIVE SUMMARY

The Executive Summary outlines the site characteristic, risk factors, and ARARs considerations essential to developing the remedial action objectives and then clearly presents the remedial action objectives. The processes and factors that proved crucial to identifying and framing alternatives are then highlighted and followed by a comparison of each alternative to the nine criteria. The selected alternative may then be presented with further discussion of relevant factors that demonstrate satisfaction of the criteria.

1.2 INTRODUCTION

The introduction provides information as to the framework to which the CMS/FS is being prepared, a list of acronyms and an outline of each section of the report.

1.3 SITE CHARACTERISTICS

This section describes the nature and history of the contamination source(s).

1.4 CORRECTIVE/REMEDIAL ACTION OBJECTIVES

This section summarizes the risk assessment, provides an overview of location and action specific ARARs, and defines chemical specific ARARs. The risk assessment results and ARARs are then used to develop narrative remedial action objectives, and, where appropriate, numeric remedial action goals.

1.5 IDENTIFICATION AND SCREENING OF ALTERNATIVES

Based upon the narrative remedial action objectives and numeric remedial action goals, remedial technologies and process options are first identified and screened. The remedial technologies and process options are then assembled into alternatives, and screened as to effectiveness, implementability, and relative cost.

1.6 DETAILED ANALYSIS OF ALTERNATIVES

The alternatives which are retained following the screening are now further refined as to technical detail and cost. The refined alternatives are then evaluated against the nine evaluation criteria:

- Overall protection of human health and the environment
- Attainment of ARARs
- Long-term protectiveness
- Short-term effectiveness
- Implementability
- Cost
- State acceptance
- Community acceptance

1.7 SELECTED ALTERNATIVE

During project scoping the stakeholders will determine if the selected alternate and analysis leading to the selected alternative is provided in the CMS/FS or under separate cover. The section provides an analysis that makes comparisons among alternatives. The selected alternative is then future described to show how it satisfies the nine criteria.

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GENERIC CMS/FS SCHEDULE

ID	Task Name	Duration	Month 1				Month 2				Month 3				Month 4				Month 5				Month 6				Month 7				Month 8				Month 9						
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
1	Prepare Draft CMS/FS	60d																																							
2	Internal Review Draft CMS/FS	14d																																							
3	Revise Draft CMS/FS	14d																																							
4	Submit Draft CMS/FS for Agency Review	1d																																							
5	Agency Review	30d																																							
6	Recieve Agency Comments	1d																																							
7	Develop Comment Resposes	14d																																							
8	Comment Resolution Meeting	1d																																							
9	CMS/FS Revision Per Comment Resolution Meeting	14d																																							
10	Agency Approval for Release	14d																																							
11	Public Comment Period	30d																																							
12	Incorporate Public Comments	14d																																							
13	Submit Revised CMS/FS	1d																																							
14	CMS/FS Approval	7d																																							
15	Incorporate Final Agency Comments	14d																																							
16	Final Agency Approval	0d																																							

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Appendix K

MASTER LIST OF POTENTIAL ARARS



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Appendix L

SUMMARY OF RISK ASSESSMENT METHODOLOGY FOR RFETS

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APPENDIX L

SUMMARY OF RISK ASSESSMENT METHODOLOGY FOR RFETS

1.0 HUMAN HEALTH RISK ASSESSMENT METHODOLOGY

A site-specific HHRAM was developed that differs from standard CERCLA guidance in some respects. The methodology has been documented in the *draft Human Health Risk Assessment Methodology for RFETS* (DOE, 1995b). The risk assessment methodology also includes the conservative screen, developed by the CDPHE and agreed to by the DOE, to ensure that the requirements of the RCRA are met. Several risk assessments for former OUs have been produced using this methodology. In the future, it is likely that it will be used for screening level risk assessment and as the basis for the CRA.

The HHRAM process, including the conservative screen, is shown in Figure N-1. Each step in the HHRAM process is done in consultation with the agencies and documented by a technical memorandum. Step 1 is the evaluation of data to determine if sufficient data of appropriate quality are available to perform a risk assessment or screen. Step 2 is the selection of potential chemicals of concern (PCOCs). Site data for inorganics and radionuclides have been compared to background values, using a battery of statistical test designed by Gilbert (1992), and accepted for use at RFETS by the DOE and the agencies. If the analyte was indicated to be above background by any of the tests it was considered a PCOC. This is a time consuming, costly, and statistically unsound (increased probability of a Type I error) process. For future risk assessments the Gilbert methodology will be treated as a statistical toolbox. The most appropriate test will be selected from the Gilbert toolbox for each analyte (inorganics and radionuclides) that has a maximum concentration greater than the background mean plus two standard deviations (M2SD). The selection of the statistical test will be a balance of the data characteristics (e.g., number of nondetects, distribution of data) of the analyte. A description of the statistical tests and their use is given in Attachment 1. All detected organics are considered to be PCOCs.

The RFCA changed the emphasis for environmental remediation to investigation, evaluation, and remediation of IHSSs and AOCs, instead of an OU-by-OU basis. The PCOC selection process will likely be applied to a particular source or associated sources grouped as an AOC. Fewer samples may be available for statistical analysis due to the change in emphasis to source areas. It will be very important that a sufficient number of samples be available for application of the Gilbert toolbox. After the determination of PCOCs, the conservative screen is applied to the data and the baseline risk assessment may be started.

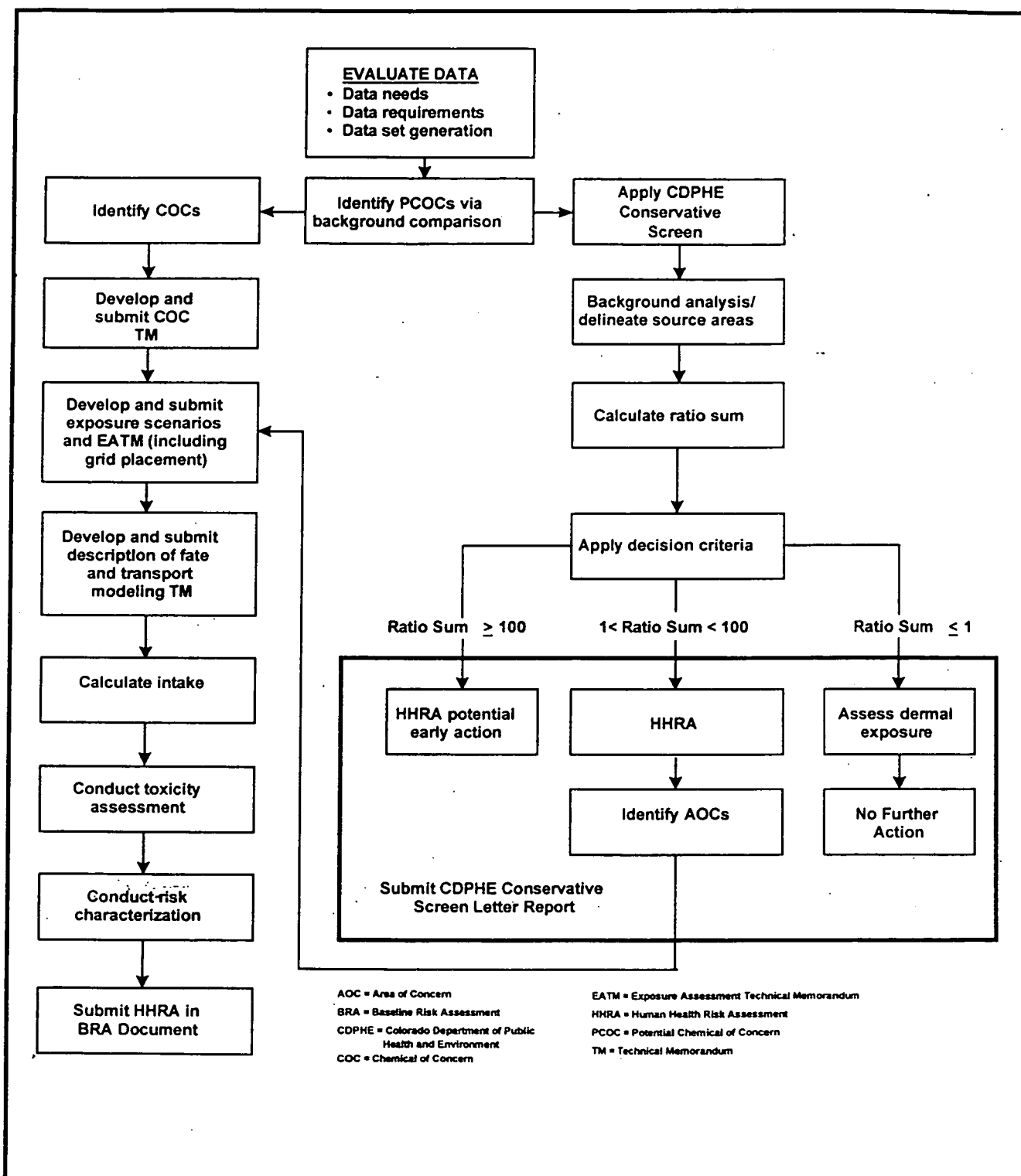


Figure L-1 Human Health Risk Assessment Methodology

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1.1 CONSERVATIVE SCREEN

The conservative screen has been accepted for use at the RFETS (DOE, 1994a). The purpose of the conservative screen is to help determine if a particular site is a candidate for no action, accelerated action, or further evaluation through the BRA process. The conservative screen is the basis of the NFA decision criteria presented in Attachment 6 of RFCA. A site that passes the conservative screen is a candidate for NFA status and free release with no land use restrictions.

The screen also provides methodologies for identifying source areas and grouping them into AOCs. The process is shown in Figure N-2. The conservative screen uses the residential PPRGs to calculate the ratios used in the decision criteria (DOE, 1995a). A letter report is submitted to the agencies to document the results.

1.2 CHEMICALS OF CONCERN

The next step in the HHRAM process is the selection of COCs. The selection process, as agreed to by the DOE and the agencies, is shown in Figure N-3.

The COCs have been selected on an OU-wide basis and then applied to each AOC within the OU. Now COC selection will often be done for single sources or sources grouped as an AOC as a result of an action level screen. It is very important that sufficient data be available for this analysis. The COC selection process for the CRA should be based on the present methodology, with COCs selected separately for the two site OUs (Buffer Zone and Industrial Area). The COCs are selected in consultation with the agencies and a TM is submitted to document the results.

1.3 EXPOSURE SCENARIOS AND PARAMETERS

Exposure scenarios and associated exposure factors, developed during negotiations among the DOE, the EPA, and the CDPHE, were transmitted to the agencies in June 1995 (DOE, 1995b). The exposure factors have been used in several BRAs for specific OUs (OUs 2, 3, 4, 5, and 6). The EPA and the CDPHE have accepted all of the exposure factors with the exception of the fraction ingested from contaminated source for the central tendency residential exposure by soil ingestion and the chemical-specific values for the soil ingestion matrix effect (EPA/CDPHE, 1995). Chemical specific soil ingestion matrix values must be submitted to the agencies for approval before being used.

The two exposure scenarios to be used in the CRA to evaluate the on-Site risks and hazards to human health from environmental contamination under the RFCA will be the open-space recreational receptor for the BZ and the office worker for the IA. Off-Site risks and Hazards will be evaluated using the residential scenario. Other scenarios may be evaluated in the CRA if agreed to by the DOE, EPA, and CDPHE.

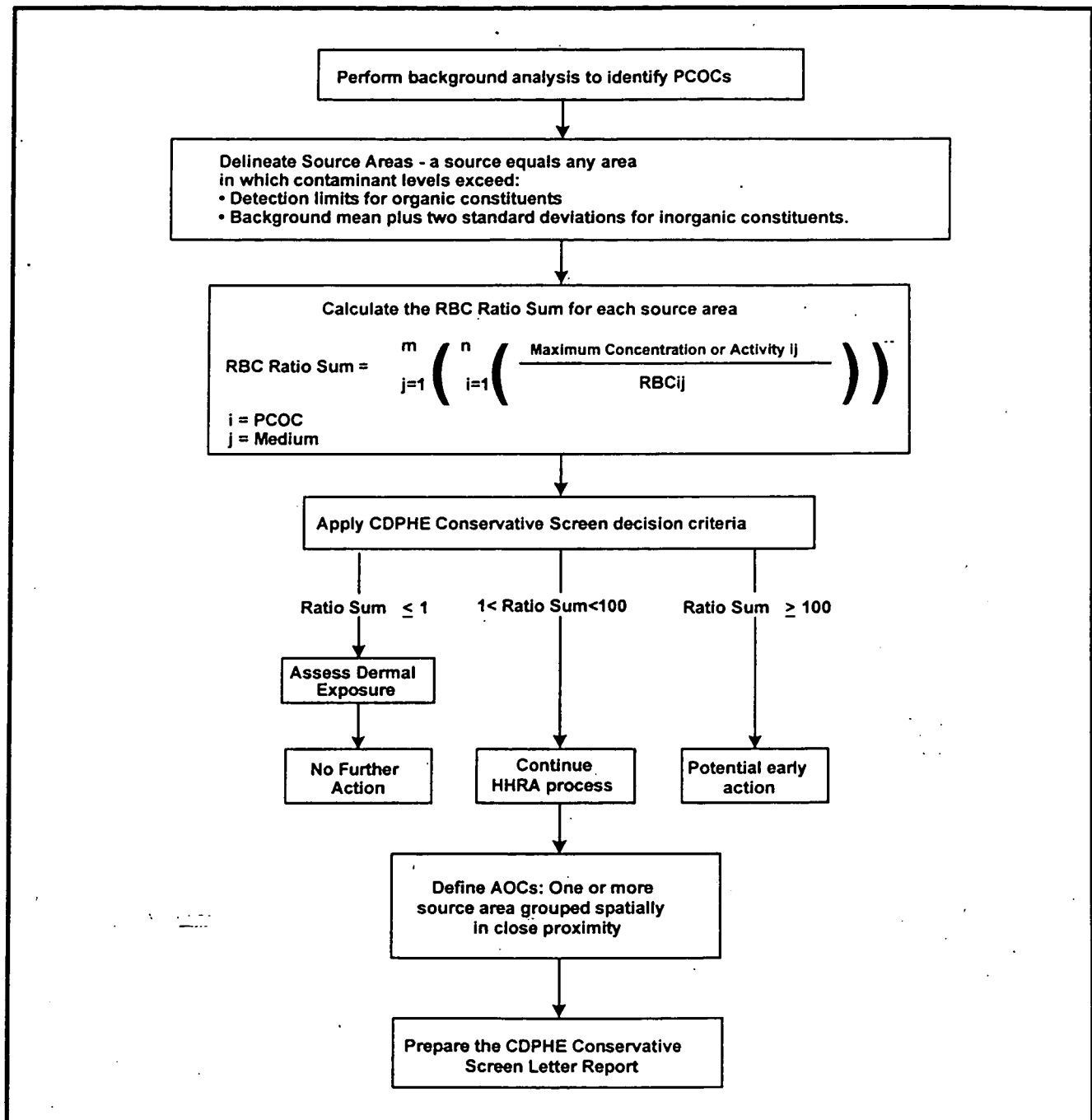


Figure L-2 CDPHE Conservative Screen

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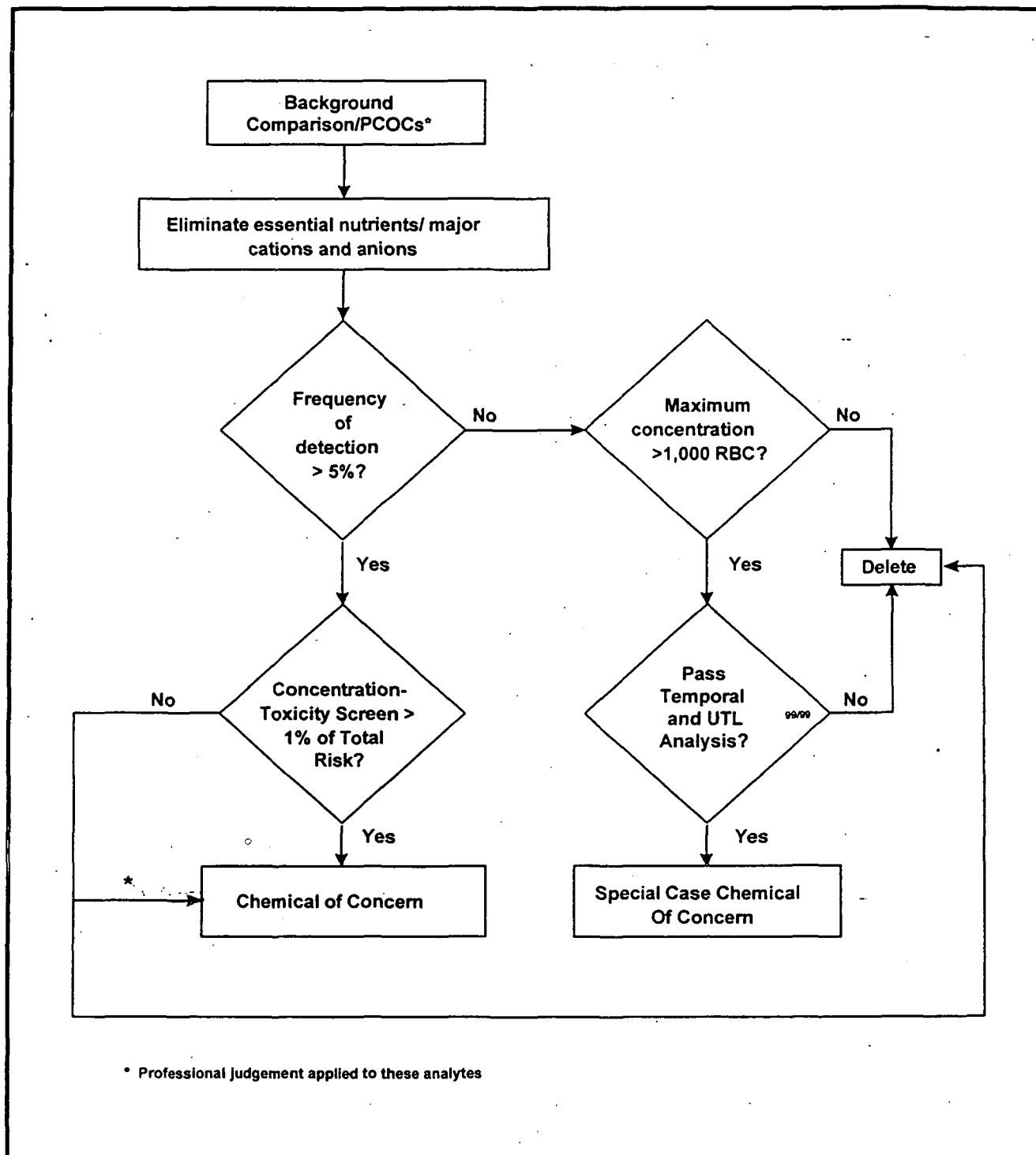


Figure L-3 Chemical of Concern Identification

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1.4 RISK CHARACTERIZATION

Exposure concentrations and risks will be calculated in accordance with EPA guidance (EPA, 1989a) as documented in the HHRAM (DOE, 1995b). Both radiological risk and dose will be estimated. Radiological doses will be calculated using methods and parameters employed for development of the ALF.

1.5 ECOLOGICAL RISK ASSESSMENT

Protection of ecological as well as human receptors is a central goal under CERCLA and the RFCA. The methodology for quantifying possible adverse effects to ecological receptors is similar to that for human receptors. A sitewide ERAM was developed that is consistent with the EPA's eight-step guidance (draft) on conducting ERAs at Superfund sites (EPA, 1994b). This methodology has been used for ecological risk assessments for the Walnut Creek and Woman Creek watersheds at RFETS (DOE, 1996c). The screening portion of this site-specific guidance is shown in Figure N-4 as described in the following documents:

- *ERAM Technical Memorandum, Sitewide Conceptual Model* (DOE, 1996a) helps identify environmental stressors and the potentially complete exposure pathways that will become the focus of the ERA.
- *ERAM Technical Memorandum, Ecological Chemicals of Concern Screening Methodology* (DOE, 1996b) describes a tiered screening process for identifying chemicals at potentially ecotoxic concentrations.

The purpose of a screening-level ERA is to detect whether a significant ecological threat exists in a geographic area. After PCOCs have been determined for a geographic area, risks are estimated by comparing maximum analyte concentrations with screening-level ecotoxicity benchmarks, with the subsequent generation of hazard quotient (HQ) values. The HQ is the result of the exposure estimate divided by the benchmark. This step is used to evaluate whether the preliminary screening is adequate to determine the presence of an ecological threat. If none of the PCOCs are present at ecotoxic concentrations, the site is considered to present a negligible or de minimis risk and a more detailed quantitative risk assessment is not warranted (EPA, 1994b). If a given IHSS or source area fails to pass the ERA screen ($HQ > 1$ for any analyte), the data are evaluated in more detail. This includes a much more comprehensive evaluation of exposure pathways and a more accurate method for estimating exposure than a screening-level ERA. The exposure estimation includes methods that account for factors which modify the frequency, duration, and intensity of contact between a receptor and the contaminated media. This evaluation results in a list of chemicals that are subjected to more detailed analysis in the ecological risk characterization.

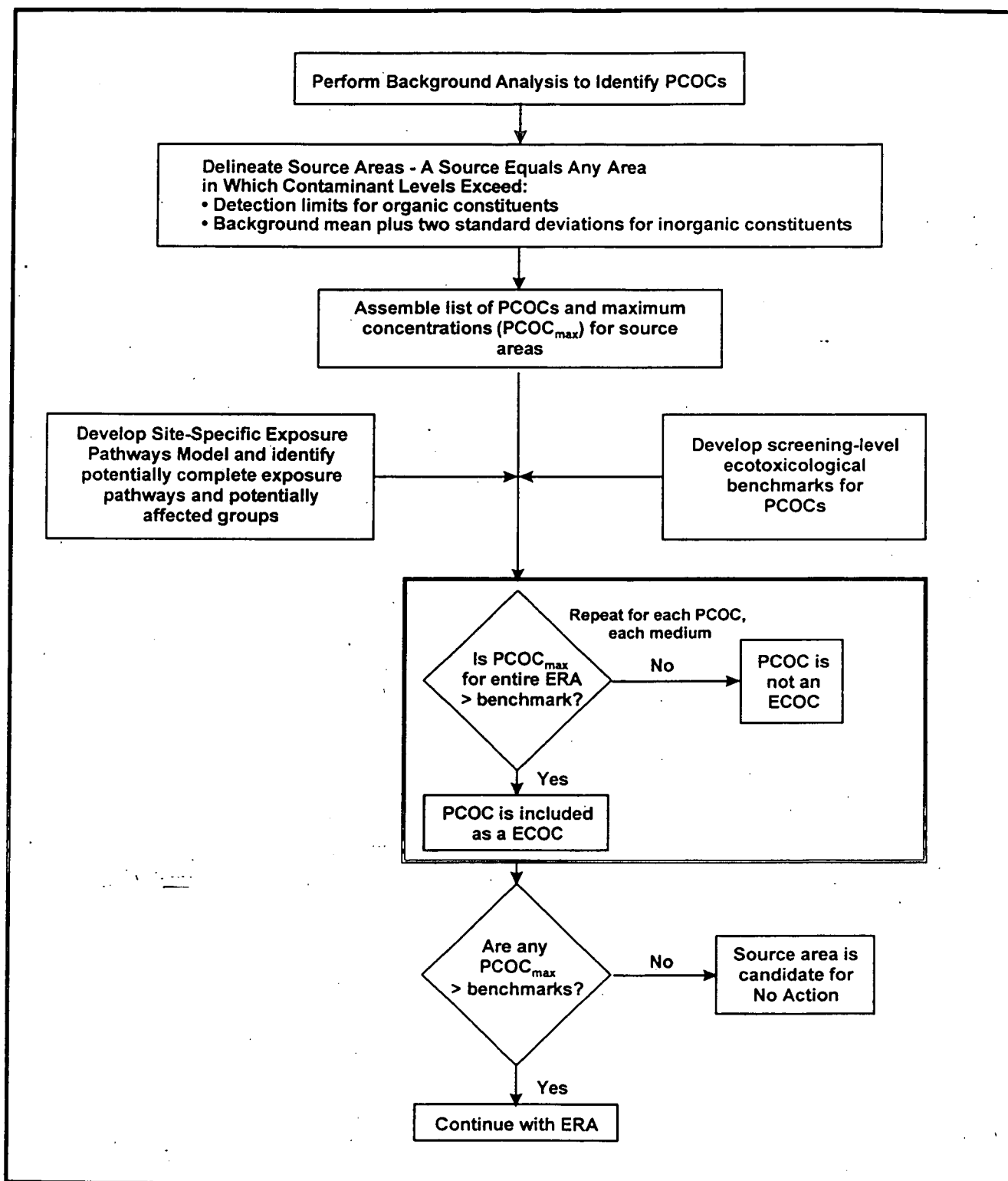


Figure L-4 Screening-Level ERA

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The characterization in the ERA integrates the exposure assessment and the effects assessment. It includes a description of risk in terms of the assessment endpoints, a discussion of the ecological significance of the effects, a summary of the overall confidence in the ERA, and a discussion of possible risk management strategies. The ERA performed for the Walnut Creek and Woman Creek watersheds will form the basis for the Ecological component of the CRA (DOE, 1996c).

ATTACHMENT 1

BACKGROUND COMPARISON (Adapted from Chromec et al., 1995)

Analytical results for metals, radionuclides, water-quality parameters, and selected organics, if appropriate, are compared to the chosen background data using one of the following five statistical tests.

Lognormal Upper Tolerance Level (UTL99/99) Each result is compared to the background 99% UTL on the 99th percentile of background. This hot measurement test assures that no hot spots in an area of concern are overlooked. If one or more measurements exceed the UTL99/99 the analyte is considered a PCOC pending application of professional judgment. UTLs cannot be reliably calculated for analytes with a very high rate (>80%) of nondetects.

The Slippage Test This is a rapid screening test. The Slippage test is a nonparametric test and can be used for all data distributions. The test should not be used if the highest value in the data set is a nondetect. If the number of site measurements that exceed the background maximum value are greater than a critical number obtained from the appropriate table, then the analyte may be a PCOC.

The Quantile Test This is also a rapid screening, nonparametric test and can be used with all data distributions. If the number of site results that are among the largest r (number selected from a table of values) measurements exceeds a predetermined number, it may be concluded that the analyte is a PCOC. The test should only be used there are no nondetects among the largest measurements of the combined background and site data sets. A p-value of 0.05 or less is considered to indicate a significant difference from background concentrations.

The Gehan Test (nonparametric ANOVA) The Gehan test is a nonparametric test that can be used when multiple detection levels are present. It is applied without replacing nondetect values. The data are ordered, ranked and scored. A "Z" statistic is calculated and compared to values from a table at a chosen p-value. A p-value of 0.05 or less is considered to indicate a significant difference from background concentrations. Gilbert did not feel that the performance of this test had been sufficiently determined and suggested that it be evaluated at the earliest possible time.

The Student's t Test This is a common parametric test for determining if the means of two populations are different. The t test is the preferred test when the background and site data are normally and independently distributed, with equal variances and no nondetects. The test is

applied on populations with at least 20 observations and less than 20% nondetects. A p-value of 0.05 or less indicates a significant difference between means.

Analytes with greater than 80% nondetects cannot be compared using statistical tests and test results for analytes having 50-80% nondetects, should be reviewed with caution.

If the selected statistical test indicates a statistical difference above background levels and it has been applied appropriately, the chemical will be considered a PCOC. Professional judgment will be also be used to retain or eliminate chemicals. Graphics may be used to support such decisions.

Professional Judgment Professional judgment is narrowly defined. It can be used to include a chemical that did not appear to be significantly different from background based on the results of the statistical test, but for which there exists a preponderance of historical data suggesting that the chemical may have been released to the environment in significant quantities. Professional judgment can also be applied to exclude a chemical for which at least one of the statistical tests was significant, but the difference from background can be explained by spatial, temporal, or pattern-recognition concepts.

Professional judgment may also determine that there was an invalid application of the statistical tests; distributional assumptions were violated or nondetect rates were so high that the statistical tests actually compared replacement values; making the test results highly suspect or meaningless. The statistical comparison of data sets where one or both data sets have high nondetect rates or high value nondetects may be an invalid use of the statistical tests (Gilbert and Simpson 1992). For RFETS, various reports (DOE 1993a, 1994, and others) have used 80 percent as the cut-off value for nondetects. However, there is inherent uncertainty in statistical test results that are produced using data sets with greater than 50 percent nondetects.

Other potential pitfalls in the application of statistical tests include violation of distributional assumptions, variance assumptions, data independence assumptions. If such assumptions are violated, the results of such statistical tests are suspect. If the results are accepted as valid, the PCOCs identified continue through the COC selection process.



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Appendix M

ACTION LEVELS FOR RADIONUCLIDES IN SOILS

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APPENDIX M

Action Levels for Radionuclides in Soils

Appendix L, Action Levels for Radionuclides in Soils, provides the technical basis for the development of the enforceable action levels for radionuclides in soil as defined in Attachment 5 to the Rocky Flats Cleanup Agreement.



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**ACTION LEVELS FOR RADIONUCLIDES IN SOILS
FOR THE
ROCKY FLATS CLEANUP AGREEMENT**

FINAL

**US DEPARTMENT OF ENERGY
US ENVIRONMENTAL PROTECTION AGENCY
COLORADO DEPARTMENT OF PUBLIC HEALTH AND THE ENVIRONMENT**

OCTOBER 31, 1996

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ACRONYMS

ALARA	As Low As Reasonably Achievable
ALF	Action Levels and Standards Framework for Surface Water, Ground Water and Soils
ANL	Argonne National Laboratory
CAB	Citizens Advisory Board
CDPHE	Colorado Department of Public Health and the Environment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
DCF	Dose Conversion Factor
DOE	US Department of Energy
EPA	US Environmental Protection Agency
GI	Gastrointestinal
ICRP	International Commission on Radiological Protection
MCL	Maximum Contaminant Level
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NRC	US Nuclear Regulatory Commission
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RME	Reasonable Maximum Exposure
SCM	Site Conceptual Model

EXECUTIVE SUMMARY

INTRODUCTION

During the Rocky Flats Cleanup Agreement (RFCA) negotiations, the Action Levels and Standards Framework for Surface Water, Ground Water and Soils (ALF) Working Group realized that setting soil action levels and cleanup standards for radionuclides was a complex process and could not be completed before public notice of the draft RFCA. The RFCA Attachment 5 states that "The parties commit to expeditiously convene a working group to determine the derivation and application of the 15 mrem per year level as well as the derivation and potential application of the 75 mrem per year level." This summary explains the consensus recommendation of that Working Group.

The Working Group convened in early March 1996 and was composed of personnel from the Department of Energy (DOE), the Environmental Protection Agency (EPA), the Colorado Department of Public Health and Environment (CDPHE) and Kaiser-Hill, L.L.C. The Working Group agreed that its charter was to develop technically defensible standards which will not exceed the 15/75 mrem per year dose limits in ALF. The Working Group recognized that the 15/75 requirement was based on EPA's draft 40CFR196, Radiation Site Cleanup Regulations, which were intended for the release of government property. Because the RFCA preamble and the Rocky Flats Vision identify future land uses for the RFETS, which exclude release of government property and permit no residential land use, pertinent sections of the draft regulation were used as guidance for the Working Group.

Radiation dose was chosen as the primary criterion for assessing radionuclide action levels. The ALF called for the consideration of both radiation dose assessment and radiation risk assessment by the working group in making its recommendations. The use of radiation dose

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to develop action levels is consistent with EPA's draft 40CFR196, Nuclear Regulatory Commission decommissioning requirement, DOE Order 5400.5, "Radiation Protection of the Public and the Environment", and DOE's proposed 10CFR834. Since these regulations are all radiation dose based, this is compelling evidence that the radiation protection community is recommending the use of radiation dose to limit environmental levels of radionuclides. In addition, the preamble to draft 40CFR196 compares the risks associated with remediation, transportation and disposal of contaminated soils against the risks of leaving contaminated soils in place at the 15/75 mrem per year dose limit. EPA concluded that the use of a 15/75 mrem dose limit to establish action levels is protective of the public. Furthermore, the dose assessment process incorporates all pertinent facets of EPA's CERCLA risk assessment process. The radionuclide working group agrees with the EPA draft regulation and is recommending the use of a radiation dose basis.

To translate the radiation dose requirements into soil action levels, it is necessary to first model radionuclide transport within the environment to a human receptor and then assess the receptor's radiation dose. The "RESRAD" computer code was chosen to model this complex process. RESRAD was specifically developed to calculate the radiation dose to an individual and also to derive action levels for radionuclides in soil. RESRAD has been verified and validated for use in assessing radioactive material in soils. An asset of the RESRAD code is its capability to assess contaminant transport to a human receptor in air, surface water, ground water and unsaturated zone soils over the 1,000 year modeling period as specified in the draft EPA regulation. This makes it possible to calculate radiation dose and action levels over any applicable exposure routes (e.g., ingestion, inhalation and external irradiation pathways) for a given receptor. RESRAD also has the capability to model multiple exposure scenarios (e.g., residential, open space and office worker) and to assess radioactive daughter products over the 1,000 year modeling period. The radionuclide working group recommends the use of RESRAD in calculating action levels for the RFETS.

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SITE CONCEPTUAL MODEL

There are two separate soil types that need to be assessed at the RFETS: surface soils and subsurface soils. Surface soils are defined in the ALF from the surface to a depth of 15 cm. Consistent with the RFCA preamble and the Rocky Flats Vision, ALF specifies that surface soil action levels would be derived using an open space exposure scenario in the buffer zone and an office worker exposure scenario in the industrial area. Subsurface soils are defined in the ALF from a depth of 15 cm to the top of the ground water table. Per the ALF, subsurface soil action levels are protective of surface water standards through ground water transport of contaminants to surface water. Ground water is not considered a potential drinking water source at RFETS as prescribed in the RFCA preamble and the Rocky Flats Vision.

Per the RFCA preamble and the Rocky Flats Vision, institutional controls may be applied at RFETS. Use of institutional controls may be considered under EPA's draft 40CFR196 when releasing a site. EPA's draft regulation states that any radioactive material in surface soils shall not impart an annual radiation dose to the appropriate human receptor (e.g. an open space receptor in the buffer zone or an office worker receptor in the industrial area) in excess of 15 millirem. Since radiation dose is being examined for a 1,000 year time period, the draft EPA regulation conservatively assumes that institutional controls fail in the future and that a hypothetical resident moves onto the site. Due to the long lived nature of radionuclides at Rocky Flats, the working group is recommending the assessment of a hypothetical future resident. This recommendation was a conscious decision by the working group despite the guidance in the vision which provides for no future residential uses. The annual radiation dose received by this hypothetical future resident will not exceed 85 millirem (Note: The annual radiation dose for this hypothetical individual in EPA's draft 40CFR196 recently changed from 75 mrem to 85 mrem).

There are two action levels that need to be calculated for surface soils. Tier I action levels are numeric levels that, when exceeded, trigger an evaluation, remedial action and/or management action, given the presence of institutional controls. Tier II action levels are numeric levels that, when met, do not require remedial action and/or institutional controls. The final action levels were derived by examining both the hypothetical future resident action levels and the action levels based on the most appropriate land use and then choosing the most conservative action level. The radionuclide working group recommends adopting the Tier I and Tier II methodology outlined in the "Action Levels and Standards Framework for Radionuclides in Surface Water, Groundwater and Soils (ALF)." Proposed modifications to ALF and a discussion of put-back levels can be found in the document entitled, "Modifications to the Action Levels and Standards Framework." Table ES-1, "Tier I & II Soil Action Levels," outlines the Tier I and Tier II action levels being recommended by the radionuclide working group. The working group is recommending that the hypothetical future resident exposure scenario at the 85 mrem level be the Tier I action level for surficial soils in the buffer zone. The working group is also recommending that the office worker exposure scenario at the 15 mrem level be the Tier I action level for surficial soils in the industrial area. Further, the working group is recommending that the Tier II action level be the hypothetical future resident exposure scenario at the 15 millirem level.

Per the ALF, subsurface soil action levels must be protective of surface water standards through the transport of contaminants in ground water. The ALF requires that subsurface soil action levels be based on the leaching of contaminants to ground water, such that the ground water levels are protective of surface water standards. This concept was discussed by the radionuclide working group and not recommended for use at RFETS. Since the subsurface soils at RFETS are highly heterogeneous, it is not currently possible to accurately model radionuclide transport in these subsurface soils. Therefore, the radionuclide working group currently recommends a conservative approach by applying the Tier I and Tier II surface soil action levels to the subsurface soils. In addition, subsurface soil leaching of radionuclides to

ground water is currently being investigated at the RFETS. If an accurate subsurface soil leaching model can be developed for RFETS in the future, and is agreed upon by the RFCA parties, the current working group recommendations may need to be updated.

RESRAD INPUT PARAMETERS

In the RESRAD computer code, there are approximately seventy different inputs that were discussed and agreed upon by the radionuclide working group for each exposure scenario. Site-specific values were chosen for these inputs whenever possible so that the action levels could be tailored to RFETS. If a site-specific value was not available, the RESRAD default input was used. The RESRAD code was used to evaluate the office worker exposure scenario, the open space exposure scenario and the hypothetical future resident exposure scenario over the 1,000 year modeling period.

RECOMMENDATIONS

The working group recommends that the hypothetical future resident exposure scenario at the 85 mrem level be the Tier I action level for surficial soils in the buffer zone. The working group also recommends that the office worker exposure scenario at the 15 mrem level be the Tier I action level for surficial soils in the industrial area. Further, the working group is recommending that the Tier II action level for the entire site be the hypothetical future resident exposure scenario at the 15 millirem level. Soils with levels of radionuclides at or below the Tier II action level do not require remedial action and/or institutional controls. Although direct exposure to subsurface soils is not anticipated for the hypothetical future resident, open space or office worker exposure scenarios, the radionuclide working group currently recommends conservatively applying the Tier I and Tier II surface soil action levels to the subsurface soils. This subsurface soil recommendation may be updated in the future.

Table ES-1 outlines these Tier I and Tier II action levels.

This working group acknowledges that in the future, new regulations, different guidance, improved calculation methods and models and better input parameters will likely become available. As this new information becomes available it will be considered in accordance with paragraph 5 of RFCA.

APPLICATION

Action levels as calculated above are only applicable when a single radionuclide is found in the environment. This is not the case at RFETS. In the environment at RFETS, the uranium (U) isotopes of U-234, U-235 and U-238 are found together, and the americium (Am) and plutonium (Pu) isotopes of Am-241 and Pu-239/240 are found together. When multiple radionuclides are found in the environment, it must be ensured that the sum of the radiation doses from all radionuclides present does not exceed the action level basis (e.g., a hypothetical future resident assessed at the 15 mrem level).

The action levels for americium and plutonium together can also be calculated since the activity of Am-241 is about 18% of the Pu-239+Pu-240 (Pu-239/240) activity in the environment (Ibrahim, 1996). Given this activity ratio, the action level for Am-241 and Pu-239/240 can be computed so that the sum of their radiation doses equals either 15 or 85 millirem to the appropriate exposure scenario. Table ES-1 includes an example of these adjusted action levels for Am-241 and Pu-239/240 if they are the only radionuclides present in soil. Since the 18% ratio actually varies in the environment, site specific data will be used to make action level comparisons. If uranium is also present in the soil, then the contribution to the radiation dose from the uranium also needs to be assessed so that the Tier I and/or Tier II action level basis is not exceeded.

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SECTION 1

INTRODUCTION

During the Rocky Flats Cleanup Agreement (RFCA) negotiations, the Action Levels and Standards Framework for Surface Water, Ground Water and Soils (ALF) Working Group realized that setting soil action levels and cleanup standards for radionuclides was a complex process and could not be completed before public notice of the draft RFCA. Therefore a radionuclide working group was formed to undertake this task. This report discusses the formation of a radionuclide working group, the radionuclide working group's application of the 15/75 mrem methodology as outlined in the draft RFCA and the radionuclide working group's recommendations concerning radionuclide action levels in soils.

Section 2 of this report discusses the formation of the radionuclide working group along with the goals of the working group. The working group members represent the US Department of Energy (DOE), the US Environmental Protection Agency (EPA), the Colorado Department of Public Health and the Environment (CDPHE) and Kaiser-Hill (K-H), L.L.C.

Section 3 of this report is a regulatory analysis that describes the regulatory basis for deriving radionuclide action levels in soils. Regulations promulgated by the DOE, EPA and Nuclear Regulatory Commission (NRC) are examined.

Section 4 of this report contains the site conceptual model for surface and subsurface soil assessment. The site conceptual model is the basis for the exposure scenarios used to derive action levels for soils.

Section 5 of this report discusses how the soil action levels were developed. The use of the RESRAD computer model is discussed and the action levels for all applicable exposure scenarios are given.

Appendix A of this report discusses the development of the parameter inputs to the RESRAD

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computer code for the hypothetical future resident exposure scenario, the open space exposure scenario and the office worker exposure scenario. RESRAD computer code outputs are also in this appendix.

Appendix B of this report discusses the expected chemical form of plutonium in the environment. The chemical form of radioactive material is significant for assessing radiation dose.

Appendix C of this report is an exposure pathway analysis. The exposure pathways applicable to the hypothetical future resident exposure scenario, the open space exposure scenario and the office worker exposure scenario are discussed and delineated.

Appendix D of this report discusses the relative importance of different isotopes of plutonium with respect to human health. The decay of plutonium, the ingrowth of daughters and plutonium toxicity are examined.

SECTION 2

RADIONUCLIDE WORKING GROUP FORMATION AND GOALS

The radionuclide working group convened in early March 1996 and was composed of personnel from the DOE, the EPA, the CDPHE and the K-H Team. The Working Group agreed that its charter was to determine the derivation and application of the 15 mrem per year level as well as the derivation and potential application of the 75 mrem per year level as outlined in the Rocky Flats Cleanup Agreement. The Working Group recognized that the 15/75 requirement was based on EPA's preliminary proposed 40CFR196, Radiation Site Cleanup Regulations.

The goals of the Working Group were:

- ~ To determine and recommend radionuclide action levels for soil;
- ~ To determine and recommend radionuclide put-back levels for soil; and
- ~ To prepare a draft technical justification document which would explain the Working Group's recommendations.

The Working Group believes its recommendations are based on a sound technical, scientific and regulatory foundation. The Working Group has consulted with the Citizens Advisory Board (CAB), the Cities of Broomfield, Westminster, Northglenn and Thornton, and the Rocky Flats Environmental Technology Site (RFETS) expert panel on radionuclide fate and transport concerning any recommendations. Proposed modifications to ALF and a discussion of put-back levels can be found in the document entitled, "Modifications to the Action Levels and Standards Framework."

SECTION 3
REGULATORY ANALYSIS OF RADIONUCLIDES IN SOILS

3.1 Introduction

In order to calculate action levels for radionuclides, a target radiation dose to an individual must be defined. This target radiation dose could be applicable to a current or future individual. After the target radiation dose is selected, the amount of radioactive material in the environment that corresponds to this target radiation dose can be calculated. This calculated value is the action level.

To select the target radiation dose, applicable regulations need to be reviewed so that regulatory requirements are met. Applicable regulations from the DOE, the EPA and the NRC were reviewed. The following radiation dose standards may apply to the assessment and remediation of radionuclides in the environment at the RFETS. These standards were evaluated so that the requirements of both current and proposed radiation protection standards could be assessed.

- * DOE Order 5400.5, "Radiation Protection of the Public and the Environment."
- * Proposed Title 10 of the Code of Federal Regulations, Part 834, "Radiation Protection of the Public and the Environment," revised August 25, 1995 (Proposed 10CFR834).
- * Draft Title 40 of the Code of Federal Regulations, Part 196, "Radiation Site Cleanup Regulations," dated October 21, 1993 (Draft 40CFR196).
- * Proposed Title 10 of the Code of Federal Regulations, Parts 20, 30, 40, 50, 51, 70 & 72, "Radiological Criteria for Decommissioning," dated August 22, 1994 (Proposed

10CFR-NRC).

None of the above regulations is based on assessing and remediating radioactive materials based on risk assessment. EPA is promoting this departure from risk assessment with their draft 40CFR196. Since the DOE, EPA and NRC are promulgating regulations using radiation dose to assess and remediate radioactive material in the environment, risk assessment will not be the basis for calculating action levels.

The requirements of the National Emission Standards for Hazardous Air Pollutants (NESHAPS) are not being considered to develop action levels; however, DOE is obligated to comply with the requirements of NESHAPS as long as RFETS is a DOE site. The DOE currently has a NESHAPS program in place. If monitoring detects a significant increase in emissions of radionuclides to the ambient air that may be due to radionuclides in soils, a source evaluation and mitigating action may be required. The action levels should be consistent with the NESHAPS requirements, since even the worst areas of soil contamination do not currently cause ambient air to exceed the NESHAPS standards.

3.2 DOE Order 5400.5

DOE Order 5400.5 prescribes the use of a 100 millirem annual radiation dose limit as recommended by the International Commission on Radiological Protection (ICRP, 1977). This order includes a recommendation that a 30 mrem radiation dose limit be applied if the actual use of a site is being examined or if the likely future use of a site is being examined. The order states that acceptable levels of radionuclides in soil shall be derived based on an environmental pathway analysis with specific property data where available. The order further states that acceptable residual radionuclide concentrations will be derived using the RESRAD (Argonne, 1993) environmental transport and radiation dose computer code. An

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As Low As Reasonably Achievable (ALARA) analysis must be a part of the RESRAD analysis. An ALARA analysis tries to reduce the radiation dose limit taking into account economic, social and technical factors.

The actual use or the likely future use exposure scenario represents the individual that could receive the largest radiation dose. For exposure scenarios considered to be less likely but plausible, the 100 millirem/year limit should not be exceeded. These exposure scenarios could include a resident, an industrial worker and/or a recreational user. Radiation dose is assessed for these exposure scenarios every year in a 1,000 year time period.

3.3 Proposed 10CFR834

The provisions of DOE Order 5400.5 are currently being proposed as 10CFR834. Proposed 10CFR834 reiterates the 100 millirem per year radiation dose standard and also states that the starting point for an ALARA analysis would be 25 to 30 millirem per year. This regulation requires an environmental pathway analysis using approved models such as RESRAD to derive acceptable levels of radionuclides in the soil. With respect to exposure scenarios, 10CFR834 states that the actual and likely use scenarios and the worst plausible use scenario shall be evaluated. The requirement to evaluate the worst plausible use is only a secondary check to ensure that application of the likely use scenario does not overlook an extremely hazardous situation or a very susceptible subgroup. 10CFR834 also recommends that the dose assessment be performed for a 1,000 year time period.

3.4 Draft 40CFR196

Draft 40CFR196 states that a remediation standard of 15 mrem/yr should be used at sites with radioactive material in all environmental media. This radiation dose limit would apply

to sites where the future land use is either unrestricted or restricted following remediation activities. If the land use at a site is restricted (e.g., restricting land use to open space use), the 15 mrem/year limit would apply to the restricted land use. If the land use is restricted, draft 40CFR196 also requires the assessment of the unrestricted release exposure scenario (i.e., residential exposure scenario). The radiation dose to be received by an unrestricted release exposure scenario will not exceed 75 mrem/yr (This has recently been updated to 85 mrem/yr.) so that any individual will not receive more than the ICRP recommended dose limit of 100 millirem even if land use restrictions fail in the future. An ALARA analysis is not required.

EPA performed an extensive regulatory review before promulgating draft 40CFR196. The preamble to draft 40CFR196 compares the risks associated with remediation, transportation and disposal of contaminated soils against the risks of leaving contaminated soils in place at the 15/75 mrem per year dose limit. EPA concluded that the use of a 15/75 mrem dose limit is protective of the public. EPA recognized that the dose assessment process incorporates all pertinent facets of a CERCLA risk assessment process.

A 1,000 year time period also needs to be assessed to comply with the requirements in draft 40CFR196. This requirement came from the fact that many sites contain radionuclides with very long half-lives. The use of this assessment period will ensure that the creation of decay products and the long-term integrity of any land use restrictions are adequately considered.

3.5 Proposed 10CFR-NRC

The proposed NRC decommissioning regulations are directly comparable to the EPA's draft 40CFR196 regulations. The NRC uses a 15 mrem/yr radiation dose limit for both unrestricted and restricted land uses at a site just like the EPA draft standard. If a site is

implementing land use restrictions, the NRC allows an individual in the future to receive a radiation dose of 100 millirem instead of 85 millirem. The NRC uses a 1,000 year assessment period and requires that an ALARA analysis be performed.

3.6 Rocky Flats Cleanup Agreement Regulatory Basis

The Radionuclide Action Levels Working Group has decided to use the draft 40CFR196, "Radiation Site Cleanup Regulations," regulations to derive action levels at the RFETS. This decision was made by the working group for the following reasons:

- * Remediation activities at the RFETS follow EPA and State of Colorado remediation requirements as outlined in the Rocky Flats Cleanup Agreement (RFCA). For radionuclide remediation, EPA's most current regulations need to be addressed.
- * Draft 40CFR196 is based on an extensive review of available radiation protection information.
- * Draft 40CFR196 is expected to be promulgated in the near future.
- * Draft 40CFR196 is not inconsistent with the requirements of DOE Order 5400.5, proposed 10CFR834 and the proposed NRC decommissioning regulations.
- * NRC regulations do not apply to DOE facilities.

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SECTION 4 SITE CONCEPTUAL MODEL

4.1 Introduction

The Site Conceptual Model (SCM) outlines the land uses that are expected to be present at the RFETS so that action levels can be calculated for these future land uses. The type of land use is very important since the amount of time an individual may contact radioactive material in the environment is directly related to the selected land use. This contact time is then transformed into an amount of radioactive material inhaled or ingested by the individual. Action levels are derived from the radiation dose associated with radioactive material inhaled and ingested, and from external gamma exposure.

4.2 Land Uses at RFETS

Future activities at RFETS include environmental restoration, decontamination and decommissioning, economic development and waste management. The Rocky Flats Local Impact Initiative is currently working with DOE and local development agencies to encourage business development at RFETS. The Rocky Flats Future Site Uses Working Group has also developed recommendations regarding future use of the RFETS property. Residential development at RFETS has not been recommended by this group or by other planning groups. Commercial and industrial uses of developed portions of the site are considered beneficial. Even though commercial development in undeveloped portions of the property has not been ruled out, preservation of this area as open space is consistent with DOE policy, the Rocky Flats Future Site Working Group recommendations and the Jefferson County Planning Department's recommendations. The Jefferson County Board of Commissioners has also adopted a resolution stating its support of maintaining, in perpetuity, the undeveloped buffer zone as open space (DOE, 1995). Open space use assumes no

development in these areas.

The land uses for RFETS are prescribed by the Rocky Flats Cleanup Agreement (RFCA) in the preamble to that document (RFCA, 1996). The preamble states that cleanup decisions and activities are to be based on open space use and limited industrial use at RFETS. These land uses are consistent with the direction of local government as outlined above. In the near-term condition, the inner and outer buffer zones will be managed and remediated to accommodate open space uses. At the beginning of the intermediate term condition, open space use in these areas will still be applicable. Industrial uses are applicable in the industrial area of the plant in the near and intermediate term conditions. The RFCA prescribes that specific future land uses and post-cleanup designations will be developed in consultation with local governments.

4.3 Surface Soil Assessment

To be consistent with the RFCA (RFCA, 1996), the basis for radionuclide action levels in surface soils is an open space exposure scenario in the buffer zone and an office worker exposure scenario in the industrial area of the plant. Consistent with 40CFR196, the working group agreed that the hypothetical future residential exposure scenario would also be evaluated. Although conservative, the assessment of a residential exposure scenario is inconsistent with current land use recommendations. Surface soils are defined as the top 15 cm of soil.

The open space exposure scenario assumes that an individual visits the buffer zone a limited portion of the year for recreational activities. This individual could hike on trails or wade in the creeks. This individual is assumed to be exposed to radioactive material in soils by directly ingesting the soils, by inhaling resuspended soils and by external gamma exposure

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from the soils. Appendix C, "Analysis of Exposure Pathways for use in Deriving Action Levels," contains a detailed discussion on the selection of these three exposure pathways. For an account of the amount of time the open space user spends at RFETS, see Appendix A, "Parameter Justification and RESRAD Output." The action level for the open space exposure scenario is the amount of a specific radioactive material in surface soil that would impart an annual radiation dose of 15 millirem to the open space user during the 1,000 year assessment period.

The office worker exposure scenario assumes that an individual works mainly indoors in a building complex surrounded by extensive paved areas or well maintained landscaping. This individual is assumed to breath outside air and ingest soil from outside the building. This individual is assumed to be exposed to radioactive material in soils by directly ingesting the soils, by inhaling resuspended soils and by external gamma exposure from the soils. Appendix C, "Analysis of Exposure Pathways for use in Deriving Action Levels," contains a detailed discussion on the selection of these three exposure pathways. For an account of the amount of time the office worker spends at RFETS, see Appendix A, "Parameter Justification and RESRAD Output." The action level for the office worker exposure scenario is the amount of a specific radioactive material in surface soil that would impart an annual radiation dose of 15 millirem to the office worker during the 1,000 year assessment period.

The hypothetical future residential exposure scenario assumes that an individual resides at RFETS. This individual lives at RFETS all year and eats homegrown produce. This individual is assumed to breath outside air and ingest soil from outside the residence. This individual is assumed to be exposed to radioactive material in soils by directly ingesting the soils, by inhaling resuspended soils, by external gamma exposure from contaminated soil and by ingesting produce grown in contaminated soil. Appendix C, "Analysis of Exposure Pathways for use in Deriving Action Levels," contains a detailed discussion on the selection of these four exposure pathways. For an account of the amount of time the resident spends at

RFETS, see Appendix A, "Parameter Justification and RESRAD Output." The action level for the residential exposure scenario is the amount of a specific radioactive material in surface soil that would impart an annual radiation dose of 15 millirem or 85 millirem to the hypothetical resident during the 1,000 year assessment period.

In order to carry out the original weapon-building mission, personnel at RFETS handled plutonium (Pu), americium (Am) and uranium (U) in a number of different operations. Rocky Flats plutonium was composed of Pu-238, Pu-239, Pu-240, Pu-241, Pu-242 and Am-241 (DOE, 1980), and the isotopes of uranium handled at RFETS are U-234, U-235 and U-238. Action levels in soils have been derived for Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Am-241, U-234, U-235 and U-238 in the environment.

To calculate the radiation dose to an individual, appropriate Dose Conversion Factors (DCF) must be chosen. These DCFs convert the radioactive material present in an exposure route to a radiation dose. The three exposure routes are the ingestion, inhalation and external gamma exposure from radioactive material in soil. DCFs are therefore available for the ingestion, inhalation and external exposure routes. The DCF for each exposure route differs with the chemical form of the radionuclide. The chemical form for americium, uranium and all daughter products were conservatively chosen so that the DCF would be maximized for each exposure route. The DCFs for plutonium were chosen based on the oxide form. For a detailed discussion of the chemical form of plutonium in the environment, see Appendix B, "Analysis of the Chemical Form of Plutonium in the Environment."

4.4 Subsurface Soil Assessment

Subsurface soils are defined from 15 cm below the ground surface to the top of the ground water table. There are no exposure pathways present for the open space, office worker or

hypothetical resident exposure scenarios to subsurface soils. Therefore, these exposure scenarios are not appropriate for subsurface soils. For this reason, the RFCA (RFCA, 1996) states that action levels derived for subsurface soils will be protective of surface water standards via ground water transport of radionuclides leached from subsurface soils. The surface water standard for radionuclides is the Maximum Contaminant Level (MCL) as defined by the RFCA.

The SCM for subsurface soils is represented by radionuclides first leaching from subsurface soils to ground water. The radionuclides in ground water are then transported to surface water where the radionuclide concentration cannot exceed the MCL. The subsurface soil action level is the smallest amount of a specific radioactive material in subsurface soil that would impart an MCL in surface water over the 1,000 year assessment period.

This subsurface soil SCM was examined closely by the radionuclide working group. The geohydrology of the RFETS was examined along with the subsurface soil transport properties of plutonium, americium, uranium and their daughter products. Also, the relationship between the subsurface soil SCM and the surface soil SCM was examined. The radionuclide working group came to the conclusion that a subsurface soil action level for radionuclides could not be developed at this time with the subsurface soil SCM defined by the RFCA. This conclusion was based on the variable characteristics of the SCM. This variability is attributable to 1) a water infiltration rate into the soil which varies both areally across the site and within the subsurface soils, 2) radionuclide-specific distribution coefficients that vary spatially within the subsurface soil, 3) a variable distance from a source of radioactive material in the subsurface soil to surface water and 4) a variable soil unsaturated/saturated zone thickness across RFETS. For these reasons, the radionuclide working group has decided to conservatively apply surface soil action levels to subsurface soils.

Currently there are efforts proceeding that may reduce the variability in the subsurface soil SCM. In the future, this variability may be reduced sufficiently to allow the application of the prescribed subsurface soil SCM. If this occurs, the current recommendation of the radionuclide working group may be modified.

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SECTION 5

ACTION LEVEL DEVELOPMENT

5.1 Introduction

All of the ingredients for developing action levels for radionuclides in surface soils have been delineated in the preceding sections. A radiation dose limit has been established, the applicable exposure scenarios have been defined and the type of soil to be assessed has been defined. All of these facets allow the calculation of a surface soil action level for the open space exposure scenario, the office worker exposure scenario and the hypothetical future residential exposure scenario. Due to the complex nature of action level development, a computer model must be utilized to derive the action levels. The RESRAD computer model was selected for use since it fulfills all modeling requirements. Action levels were developed for the given exposure scenarios in surface soils. These action levels will be used as Tier I and Tier II action levels in the Action Levels and Standards Framework for Surface Water, Groundwater and Soils (RFCA, 1996).

5.2 Computer Code Requirements

There are a number of different processes that need to be assessed to derive action levels. Due to the complexity of each of these processes, it would be beneficial to have a computer code that would assess each of the following processes. For efficiency and compatibility reasons, the ideal computer code would incorporate all of the following processes. It is also important that the computer code(s) be validated and verified.

The first process that has to be modeled is the transport of radioactive material in surface soil to an individual. This transport can include soil transport in air, surface water, ground water and/or unsaturated zone pore water. For assessing surface soil, the most important

environmental transport process for deriving action levels is the air transport process. This is important for the inhalation exposure pathway. All other environmental transport processes serve to decrease the amount of radioactive material present in surface soil. This decrease in radioactive material over time increases the action level over time. All environmental transport processes modeled must be able to assess the movement of radioactive material and their daughter products over the 1,000 year assessment period.

The second process that needs to be examined is the exposure of a receptor to the radioactive material in the soil. There are four exposure pathways that need to be assessed by the chosen computer code. These pathways include incidental ingestion of soil, inhalation of resuspended soil, external gamma exposure from radionuclides in the soil and ingestion of homegrown produce.

The next process to be concerned with is radiation dosimetry. Once the radioactive material enters the body, a radiation dose must be calculated so that an action level can be derived. There are three modes through which radioactive material can impart radiation dose to an individual. These are through the ingestion of radioactive material, the inhalation of radioactive material and external gamma exposure from radioactive material in soil. All three of these radiation dose modes need to be assessed for each radionuclide. Since a 1,000 year assessment period is required, the radiation dose from daughter products must also be assessed.

5.3 Computer Code Selection

The RESRAD computer code (Argonne, 1993) was selected for use in deriving surface soil action levels because it meets all modeling requirements. RESRAD was developed at Argonne National Laboratory for the US Department of Energy (DOE) so that radiation dose

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to an individual as well as action levels could be derived for radioactive material in soils. RESRAD can model all four of the above processes in an integrated manner and can assess daughter products over the 1,000 year modeling period. RESRAD has also been validated and verified (Argonne, 1994).

Surface soils can be physically modeled by the RESRAD code. Soils are broken down into layers within the code, and the top layer, at the ground surface, can be a cover or a contaminated zone. For deriving surface soil action levels, the contaminated zone is considered to be the surface soils with no cover. Underneath the contaminated zone, RESRAD has the capacity to model five separate uncontaminated/unsaturated layers before reaching ground water. This configuration meets the requirements for deriving action levels at the RFETS.

RESRAD can model the required environmental transport processes. It contains an air transport algorithm that looks at resuspension of radioactive material in soils and transport to an individual. The assessment of the air transport pathway is essential to calculating surface soil action levels. Unsaturated zone transport and ground water transport processes are also assessed within the RESRAD code. These two algorithms will allow leaching of radioactive material out of the surface soils for the 1,000 year assessment period. These unsaturated zone transport and ground water transport algorithms could be used in the future to model the leaching of contaminants from subsurface soils at the RFETS. With respect to environmental transport requirements, RESRAD meets the requirements for deriving action levels at RFETS.

The RESRAD code can model the four exposure pathways: incidental ingestion of soil, inhalation of resuspended soil, external gamma exposure from radionuclides in the soil and ingestion of homegrown produce. RESRAD can assess nine exposure pathways in total.

These exposure pathways are external gamma exposure, soil inhalation, plant ingestion, meat ingestion, milk ingestion, aquatic food ingestion, drinking water ingestion, soil ingestion and radon exposure. This shows the flexibility of the RESRAD code in assessing many different situations. Exposure pathways can be turned on and off in RESRAD depending on the specific situation. Concerning exposure pathways, this meets the requirements for deriving action levels at the RFETS.

The RESRAD code also has an extensive library of radionuclides in their radiation dosimetry module. This allows the calculation of radiation dose and action levels on the radionuclides of interest and on their daughter products over the 1,000 year modeling period. The radionuclide database includes inhalation, ingestion and external exposure Dose Conversion Factors (DCF). These DCFs are also available within RESRAD for the different chemical forms of radionuclides. Concerning the use of DCFs, this meets the requirements for deriving action levels at the RFETS.

5.4 RESRAD Parameter Input Development

There were four separate RESRAD computer runs that needed to be performed to obtain all required action levels. These included the following:

- * An Open Space Exposure Scenario Assessed at the 15 Millirem Level
- * An Office Worker Exposure Scenario Assessed at the 15 Millirem Level
- * A Hypothetical Future Resident Assessed at the 15 Millirem Level
- * A Hypothetical Future Resident Assessed at the 85 Millirem Level

There were 53 separate input parameters to the RESRAD code for the open space and office worker exposure scenarios. The hypothetical future resident had 83 separate input

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parameters. The parameters for all of these exposure scenarios were chosen to be as site specific as possible to satisfy the requirements of the site conceptual model. When a site specific parameter was not available, the RESRAD default parameter was used. For a discussion of all parameter inputs with their selected values, see Appendix A, "Parameter Justification and RESRAD Output."

5.5 RESRAD Modeling Results

Table 5-1, "Single Radionuclide Soil Action Levels," outlines the Tier I and Tier II action levels developed using RESRAD. The action levels in this table represent the radionuclide-specific activity in the soil that would impart a maximum radiation dose of either 15 millirem or 85 millirem to the given exposure scenario over the 1,000 year modeling period.

5.6 Use of RESRAD Modeling Results

The action levels outlined above need to be applied in the field. To do this, a number of simplifying assumptions can be made while still assuring the protectiveness of the action levels. This simplification allows implementation of these action levels in an efficient manner.

The first simplification is that the number of radionuclides needing assessment at RFETS can be reduced. All uranium (U) radionuclides present at RFETS (e.g., U-234, U-235 and U-238) in the environment will be assessed with respect to their action levels. Appendix D, "Analysis of Assessment Needs for Rocky Flats Plutonium," outlines the reasons why the only constituents from Rocky Flats plutonium that need to be assessed in the environment are Pu-239, Pu-240 and Am-241. All isotopes of Rocky Flats plutonium were initially assessed

for completeness since plutonium in the nuclear fabrication process was composed of Pu-238, Pu-239, Pu-240, Pu-241 and Pu-242 (DOE, 1980). Am-241 is also contained in this mix of plutonium due to its ingrowth from Pu-241 (DOE, 1980). The plutonium found in the environment though will have different activities of plutonium and americium than what is found in the fabrication process because of radionuclide decay and ingrowth over time. In examining this decay and ingrowth with regard to radionuclide toxicity, it is shown in Appendix D that it is necessary to only assess Pu-239, Pu-240 and Am-241 in the environment.

The number of exposure scenarios that need to be examined can also be reduced. The more conservative of the Tier I action level for the open space exposure scenario and the Tier I action level for the hypothetical future resident will be applied in the buffer zone at RFETS. Also, the more conservative of the Tier I action level for the office worker exposure scenario and the Tier I action level for the hypothetical future resident will be applied in the industrial area at RFETS. These comparisons were made and the result is that the Tier I action level in the buffer zone will be based on the hypothetical future resident exposure scenario and that the Tier I action level in the industrial area will be based on the office worker exposure scenario. Table 5-2, "Tier I & II Soil Action Levels," outlines the soil action levels after the above simplifications are made.

To assure that the soil action levels will be protective of human health when multiple radionuclides are present, the sum of the radiation doses from all radionuclides in soil must not exceed the Tier I or Tier II dose limit of 15 millirem or 85 millirem. A "Sum of Ratios" method will be used when more than one radionuclide is present in soils. Table 5-3, "Sum of Ratios Example," outlines this method. First, a ratio is formed for each radionuclide by dividing the activity of the radionuclide found in soils by the appropriate soil action level. This ratio actually represents the fraction of the radiation dose from the action level. In Table 5-3, the action level chosen for comparison is the Tier II action level for RFETS which is the

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hypothetical future resident assessed at the 15 millirem level. In this example, the radiation dose from U-235 is 1% of 15 millirem or 0.15 millirem at a soil activity of 0.3 pCi/gram. Therefore, when the ratio from each radionuclide is summed, this ratio sum is the fraction of the radiation dose limit for the action level. In Table 5-3, the sum of the ratios is 0.22 or 22% of 15 millirem. In this example, the Tier II action level is not exceeded since the sum of ratios is less than or equal to 1.0. If the sum of ratios exceeded 1.0, the action level would be exceeded.

The action levels for americium and plutonium together can also be calculated since the activity of Am-241 is about 18% of the Pu-239+Pu-240 (Pu-239/240) activity in the environment (Ibrahim, 1996). Given this activity ratio, the action level for Am-241 and Pu-239/240 can be computed so that the sum of their radiation doses equals either 15 or 85 millirem to the appropriate exposure scenario. Table 5-2 includes an example of these adjusted action levels for Am-241 and Pu-239/240 if they are the only radionuclides present in soil. Since the 18% ratio actually varies in the environment, site specific data will be used to make action level comparisons. If uranium is also present in the soil, then the contribution to the radiation dose from the uranium also needs to be assessed so that the Tier I and/or Tier II action level basis is not exceeded.

Chemical action levels are risk-based, and chemical risk is considered additive when multiple chemicals are present. Radionuclide action levels are dose-based, and radiation dose is considered additive when multiple radionuclides are present. Chemicals and radionuclides will be assessed independently on a project-specific basis using methodology that is protective of human health and the environment. The cumulative effects of chemicals and radionuclides will be assessed on a project-specific basis if the chemical risk and the radionuclide dose are near their respective Tier I action levels.

5.7 Action Level Uncertainties

The calculated values recommended as action levels are based on several assumptions which have associated limitations. These include:

1. The regulatory basis for developing these action levels is EPA's draft rule, 40CFR196, which is not yet final and may be changed before it is promulgated.
2. Any environmental computer model, including the RESRAD model, has inherent limitations with regard to precise simulation of the actual environment. Some of these limitations involve which input parameters are chosen to represent the complex natural setting which may vary across a large site. Environmental transfer factors and dose conversion factors used in the model may not always reflect site-specific conditions.
3. There are inherent uncertainties in estimating either dose or risk from ionizing radiation.
4. Institutional controls will eliminate the ground water ingestion pathway by establishing specific land uses and controls on ground water use. A basic assumption of RFCA is that ground water from contaminated areas of the site is captured, controlled and measured within the surface water system before leaving the site. An additional assumption is that the small amount of shallow ground water is not a sustainable, viable source of residential drinking water.
5. Attachment 5 of RFCA requires subsurface soil action levels to be protective of surface water standards via ground water, and surface soil action levels to be

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protective of surface water standards via runoff. Existing data supports the proposition that radionuclides in soil are stable and relatively immobile. This is the basis for determining not to include these transport pathways in the modeling done to develop the proposed action levels. It is also assumed that actions required by the proposed action levels for radionuclides in soil (removals and/or stabilization) will provide sufficient protection for surface water. Those actions will control the worst areas of radiological contamination in soils, and so far, even these areas have not impacted surface water above the 0.15 pCi/L level at the point of compliance.

6. The proposal to set subsurface soil action levels equal to surface soil action levels assumes there will be no uncontrolled human exposure to subsurface soils and presumes that surface soil action levels will be protective of surface water via ground water. It is also assumed that the proposed surface soil action levels are lower than values that any subsurface soil modeling would produce.

This working group acknowledges that in the future, new regulations, different guidance, improved calculation methods and models and better input parameters will likely become available. As this new information becomes available it will be considered in accordance with paragraph 5 of RFCA.

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TABLE 5-1
SINGLE RADIONUCLIDE SOIL ACTION LEVELS

Radionuclide	<u>TIER I</u> <u>ACTION</u> <u>LEVEL</u>	<u>TIER I</u> <u>ACTION</u> <u>LEVEL</u>	<u>TIER I</u> <u>ACTION</u> <u>LEVEL</u>	<u>TIER II</u> <u>ACTION</u> <u>LEVEL</u>
	Open Space Exposure Scenario, Surficial Soils Exposure, 15 Millirem Dose Limit (pCi/gram)	Office Worker Exposure Scenario, Surficial Soils Exposure, 15 Millirem Dose Limit (pCi/gram)	Hypothetical Residential Exposure Scenario, Surficial Soils Exposure, 85 Millirem Dose Limit (pCi/gram)	Hypothetical Residential Exposure Scenario, Surficial Soils Exposure, 15 Millirem Dose Limit (pCi/gram)
Americium-241	1283	209	215	38
Plutonium-238	10580	1164	1529	270
Plutonium-239	9906	1088	1429	252
Plutonium-240	9919	1089	1432	253
Plutonium-241	48020	7801	19830	3499
Plutonium-242	10430	1145	1506	266
Uranium-234	11500	1627	1738	307
Uranium-235	1314	113	135	24
Uranium-238	5079	506	586	103

* The action levels in this table apply to single radionuclides only which does not exist at RFETS. See text for application of these action levels.

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SECTION 6 **REFERENCES**

References

Argonne, 1993 - Manual for Implementing Residual Radioactive Material Guidelines Using RESRAD, Version 5.0, Environmental Assessment and Information Sciences Division, Argonne National Laboratory, ANL/EAD/LD-2, September 1993

DOE, 1980 - Final Environmental Impact Statement, Rocky Flats Plant Site, Golden, CO, US Department of Energy, DOE/EIS-0064, April 1980

DOE, 1995 - Phase II RFI/RI Report, 903 Pad, Mound and East Trenches Area, Operable Unit Number 2, Draft Final, US Department of Energy, May 1995

Ibrahim, 1996 - Comparative Distribution of Am-241 and Pu-239/240 in Soils Around the Rocky Flats Environmental Technology Site, Health Physics, Vol. 70, No. 4, April 1996

ICRP, 1977 - International Commission on Radiological Protection (ICRP), Recommendations of the ICRP, ICRP Publication 26, 1977

RFCA, 1996 - Rocky Flats Cleanup Agreement, Joint Agreement between the US Department of Energy, the US Environmental Protection Agency, the Colorado Department of Public Health and Environment and the State of Colorado, dated July 19, 1996



Document
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Sheet

Appendix N

**PROGRAMMATIC PRELIMINARY REMEDIATION GOALS
TABLES**

1.0 INTRODUCTION

DOE developed risk-based PPRGs in 1995 to establish initial site-wide cleanup targets for contaminants for each environmental medium. The PPRGs are currently used in RFCA Attachment 5, as action levels for the following mediums:

- Groundwater Action Levels: PPRGs based on residential groundwater ingestion scenario are used where no Maximum Contaminant Level (MCL) is available from EPA;
- Surface Soil Action Levels: For non-radionuclides, PPRGs are used as action levels for the appropriate land use, e.g., industrial used or open space use; and
- Subsurface Soil Action Levels: For non-radionuclide inorganics, PPRGs are used as action levels for the appropriate land use, e.g., industrial use or open space use.

PPRGs are reviewed and updated, as necessary, on an annual basis.

2.0 EXPOSURE PATHWAYS

In order to standardize the risk-based PPRGs across RFETS, programmatic exposure pathways and receptors were established. The following tables identify the receptors and exposure pathways selected for each environmental medium:

- Table 1: Residential Groundwater Exposure Scenario
- Table 2: Office Worker Soil Exposure Scenario
- Table 3: Open Space Surface Water Exposure Scenario
- Table 4: Open Space Surface Soil Exposure Scenario

Standard assumptions given in Risk Assessment Guidance for Superfund (RAGS), Part B (USEPA, 1991) were used in developing risk-based PPRG pathways where available. For situations not addressed by RAGS, Part B, standard assumptions given in RAGS, Part A (USEPA, 1989) were used. In addition, site-specific information was used where appropriate to supplement assumptions given in EPA guidance. Best professional judgement was applied when default values differed from site-specific information.

In addition to EPA and site-specific information, CDPHE guidance (*Interim Final Policy and Guidance on Risk Assessments for Corrective Action at RCRA Facilities*) was consulted for exposure pathways and parameters. While this guidance has not been finalized, it was reviewed and CDPHE was consulted on its use during development of the risk-based PPRG pathways.

3.0 METHODOLOGY, EQUATIONS, AND ASSUMPTIONS

Risk-based PPRGs were developed for all Target Analyte List metals, Target Compound List organics and 13 radionuclides for the residential groundwater exposure scenario; the office worker surface soil exposure scenario; the open space surface water exposure scenario; and the open space surface soil exposure scenario. Separate risk-based equations were developed to account for the carcinogenic, noncarcinogenic, and/or radiological effects of the contaminant. Risk-based PPRGs for carcinogens (including radionuclides) were calculated by setting the carcinogenic target risk level at 10^{-6} . A target risk level of 10^{-6} means that an individual has a one-in-one million probability of developing cancer over a lifetime as a result of exposure to a specific contaminant. This risk is in addition to the probability of an individual developing cancer from some other factors such as those associated with heredity or lifestyle. Similarly, risk-based PPRGs for toxicants (noncarcinogens) were calculated by setting the hazard quotient equal to 1 for each contaminant. A hazard quotient is the ratio of a single substance exposure level of a chemical contaminant over a specified period to the reference dose for the chemical. The reference dose represents an estimate of an exposure level for the human population, including sensitive subpopulations that is likely to be without appreciable deleterious effects during a lifetime. For some of the contaminants, both a carcinogenic and noncarcinogenic toxicity information was available. For these contaminants, both a carcinogenic and noncarcinogenic risk-based concentration was calculated and the more restrictive value was selected as the risk-based PPRG. The risk-based equations for radiological effects were used to calculate the risk-based PPRGs for the 13 radionuclides.

The risk-based PPRG exposure scenarios and equations provided in Table 1 through 4 include all of the exposure pathways (e.g., direct ingestion of soils) identified for the exposure scenario; separate risk-based PPRGs were not calculated for each exposure pathway.

4.0 CHEMICAL TOXICITY INFORMATION

The chemical-specific toxicity values used for the calculation of the risk-based PPRGs are presented in Table 5. The toxicity information used to calculate the risk-based PPRGs included in the slope factor and unit risk for evaluating carcinogenic effects; the reference dose (RfD); and the reference concentration (RfC) for evaluating noncarcinogenic effects. Toxicity values were obtained from the latest information in EPA's Integrated Risk Information System (IRIS) files and the 1997 EPA Health Effects Assessment Summary Tables. Values for polycyclic aromatic hydrocarbons were calculated using EPA's Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons.

5.0 RFETS PPRGs

Table 6 is a summary of the PPRGs for each exposure scenario.

Table 1: Residential Exposure Scenario RFETS PPRGs

The **Residential Groundwater Exposure Scenario** consists of the following pathway: ingestion of groundwater (which includes radiation exposure while ingesting groundwater) for an adult resident living at the site for 30 years. This scenario includes only pathways that were evaluated in the Rocky Flats Cleanup Agreement (RFCA) to derive action levels.

Exposure Parameter	Variable	Unit	Value	Source
General Assumptions				
Target hazard index	THI	--	1	EPA, 1991a
Target excess lifetime cancer risk	TR	--	1E-06	EPA, 1991a
Adult body weight	BW	kg	70	EPA, 1991b
Residential Exposure Scenario Assumptions				
Averaging time - noncarcinogenic	AT_NC	yr	30	EPA, 1991b
Averaging time - carcinogenic	AT_C	yr	70	EPA, 1991b
Exposure frequency	EF	day/yr	350	EPA, 1991b
Exposure duration	ED	yr	30	EPA, 1991b
Daily water ingestion rate	IRw	L/day	2	EPA, 1991b
Toxicity Values				
Oral reference dose	RfDo	mg/kg-day	chemical-specific	--
Oral slope factor	SFo	(mg/kg-day) ⁻¹	chemical-specific	--
Ingestion slope factor - radiological effects	SFORAD	risk/pCi	chemical-specific	--

Risk-Based PPRG

Residential Groundwater Exposure Scenario-Noncarcinogenic Effects

$$\text{PPRG (mg/L)} = (\text{THI} \times \text{BW} \times \text{AT_NC} \times 365\text{d/yr}) / (\text{EF} \times \text{ED} \times \text{IRw} \times 1/\text{RfDo})$$

Residential Groundwater Exposure Scenario-Carcinogenic Effects

$$\text{PPRG (mg/L)} = (\text{TR} \times \text{BW} \times \text{AT_C} \times 365\text{d/yr}) / (\text{EF} \times \text{ED} \times \text{IRw} \times \text{SFo})$$

Residential Groundwater Exposure Scenario-Radiological Effects

$$\text{PPRG (pCi/L)} = \text{TR} / (\text{EF} \times \text{ED} \times \text{IRw} \times \text{SFORAD})$$

Notes:

-- Not applicable

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Table 1: Residential Exposure Scenario RFETS PPRGs

Sources:

EPA, 1991a = U.S. Environmental Protection Agency. 1991. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part B, Development of Risk-Based Preliminary Remediation Goals. Interim. Office of Emergency and Remedial Response, Washington, D.C. Publication 9285.7-01B. December.

EPA, 1991b = U.S. Environmental Protection Agency. 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.6-03. March 25.

Table 2: Office Worker Exposure Scenario RFETS PPRGs

The **Office Worker Surface Soil Exposure Scenario** consists of the following pathways: incidental ingestion of surface soil and indoor inhalation of surface soil particulates for an adult office worker at the site for 25 years. This scenario includes only pathways that were evaluated in the Rocky Flats Cleanup Agreement (RFCA) to derive action levels.

Exposure Parameter	Variable	Unit	Value	Source
General Assumptions				
Target hazard index	THI	--	1	EPA, 1991a
Target excess lifetime cancer risk	TR	--	1E-06	EPA, 1991a
Adult body weight	BW	kg	70	EPA, 1991b
Office Worker Exposure Scenario Assumptions				
Averaging time - noncarcinogenic	AT_NC	yr	25	EPA, 1991b
Averaging time - carcinogenic	AT_C	yr	70	EPA, 1991b
Exposure frequency	EF	day/yr	250	EPA, 1991b
Exposure duration	ED	yr	25	EPA, 1991b
Daily indoor inhalation rate	IRa	m ³ /day	8.8	ICRP 66, 1993
Particulate Emission Factor	PEF	m ³ /kg	1.32E+09	EPA, 1996
Soil ingestion rate	IRs	mg/day	50	EPA, 1991b
Gamma shielding factor	Se	--	0.2	EPA, 1991a
Gamma exposure factor (annual) = (EF / 365 day/yr) [a]	Te_A	--	6.85E-01	EPA, 1991a
Gamma exposure factor (daily) = (8 hr/day / 24 hr/day)	Te_D	--	3.33E-01	EPA, 1991a
Toxicity Values				
Oral reference dose	RfDo	mg/kg-day	chemical-specific	--
Oral slope factor	SFo	(mg/kg-day) ⁻¹	chemical-specific	--
Ingestion slope factor - radiological effects	SFO _{RAD}	risk/pCi	chemical-specific	--
Inhalation reference dose	RfDi	mg/kg-day	chemical-specific	--
Inhalation slope factor	SFi	(mg/kg-day) ⁻¹	chemical-specific	--
Inhalation slope factor - radiological effects	SFi _{RAD}	risk/pCi	chemical-specific	--
External exposure slope factor	SFe	(risk/yr per pCi/g)	chemical-specific	--

Risk-Based PPRG

Office Worker Surface Soil Exposure Scenario-Noncarcinogenic Effects

$$\text{PPRG (mg/kg)} = (\text{THI} \times \text{BW} \times \text{AT_NC} \times 365\text{d/yr}) / (\text{EF} \times \text{ED} \times ((1/\text{PEF} \times \text{IRa} \times 1/\text{RfDi}) + (1\text{E-}06 \text{ kg/mg} \times \text{IRs} \times 1/\text{RfDo})))$$

Table 2: Office Worker Exposure Scenario RFETS PPRGs

Office Worker Surface Soil Exposure Scenario-Carcinogenic Effects

$$\text{PPRG (mg/kg)} = (\text{TR} \times \text{BW} \times \text{AT_C} \times 365\text{d/yr}) / (\text{EF} \times \text{ED} \times ((1/\text{PEF} \times \text{IRa} \times \text{SFi}) + (1\text{E-06 kg/mg} \times \text{IRs} \times \text{SFo})))$$

Office Worker Surface Soil Exposure Scenario-Radiological Effects

$$\text{PPRG (pCi/g)} = \text{TR} / [\text{ED} \times ((\text{EF} \times 1/\text{PEF} \times 10^3 \text{ g/kg} \times \text{IRa} \times \text{SF}_{\text{RAD}}) + (\text{EF} \times 1\text{E-03 g/mg} \times \text{IRs} \times \text{SF}_{\text{RAD}}) + (\text{SFe} \times (1-\text{Se}) \times (\text{Te_A} \times \text{Te_D})))]$$

Notes:

-- Not applicable

[a] Extrapolated to calculate annual exposure.

Sources:

EPA, 1991a = U.S. Environmental Protection Agency. 1991. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part B, Development of Risk-Based Preliminary Remediation Goals. Interim. Office of Emergency and Remedial Response, Washington, D.C. Publication 9285.7-01B. December.

EPA, 1991b = U.S. Environmental Protection Agency. 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.6-03. March 25.

EPA, 1996 = U.S. Environmental Protection Agency. 1996. Soil Screening Guidance: Technical Background Document. Office of Emergency and Remedial Response, Washington, D.C. EPA/540/R-95/128. May.

ICRP 66, 1993 = International Commission on Radiological Protection (ICRP). 1993. Human Respiratory Tract Model for Radiological Protection. ICRP Publication 66. September.

Table 3: Open Space Surface Water Exposure Scenario RFETS PPRGs

The Open Space Surface Water Exposure Scenario consists of the following pathway: incidental ingestion of surface water for an open space visitor who recreates at the site for 30 years. The open space receptor visits the site 100 times per year. This scenario includes only pathways that were evaluated in the Rocky Flats Cleanup Agreement (RFCA) to derive action levels.

Exposure Parameter	Variable	Unit	Value	Source
General Assumptions				
Target hazard index	THI	--	1	EPA, 1991a
Target excess lifetime cancer risk	TR	--	1E-06	EPA, 1991a
Adult body weight	BW	kg	70	EPA, 1991b
Open Space Exposure Scenario Assumptions				
Averaging time - noncarcinogenic	AT_NC	yr	30	EPA, 1991b
Averaging time - carcinogenic	AT_C	yr	70	EPA, 1991b
Contact rate	CR	L/hr	0.05	(1)
Exposure time	ET	hr/day	1	(2)
Exposure frequency	EF	day/yr	100	JeffCo, 1996
Exposure duration	ED	yr	30	EPA, 1991b
Toxicity Values				
Oral reference dose	RfDo	mg/kg-day	chemical-specific	--
Oral slope factor	SFo	(mg/kg-day) ⁻¹	chemical-specific	--
Ingestion slope factor - radiological effects	SF _{ORAD}	risk/pCi	chemical-specific	--

Risk-Based PPRG

Open Space Surface Water Exposure Scenario-Noncarcinogenic

$$\text{PPRG}(\text{mg/L}) = \{\text{THI} \times \text{BW} \times \text{AT_NC} \times 365 \text{ d/yr}\} / \{\text{CR} \times \text{ET} \times \text{EF} \times \text{ED} \times 1/\text{RfDo}\}$$

Open Space Surface Water Exposure Scenario-Carcinogenic

$$\text{PPRG}(\text{mg/L}) = \{\text{TR} \times \text{BW} \times \text{AT_C} \times 365 \text{ d/yr}\} / \{\text{CR} \times \text{ET} \times \text{EF} \times \text{ED} \times \text{SFo}\}$$

Open Space Surface Water Exposure Scenario-Radiological Effects

$$\text{PPRG}(\text{pCi/L}) = \{\text{TR}\} / \{\text{CR} \times \text{ET} \times \text{EF} \times \text{ED} \times \text{SF}_{\text{ORAD}}\}$$

Sources:

(1) Ingestion Rate based upon open-space recreational user wading at Denver's Lowry Landfill Superfund Site (50 mL/day, RME; 25 mL/day, CT). For comparison, a single value of 35 mL/day is specified for DOE's Fernald Site (wading in shallow Paddy's Run).

(2) Exposure Time based upon DOE's Fernald Site recreational use (0.5 hr/day, CT) and on the Clear Creek/Central City Superfund Site recreational user (1.0 hr/day, RME, assuming that wading time would be the same as swimming time).

EPA, 1991a = U.S. Environmental Protection Agency. 1991. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part B, Development of Risk-Based Preliminary Remediation Goals. Interim. Office of Emergency and Remedial Response, Washington, D.C. Publication 9285.7-01B. December.

EPA, 1991b = U.S. Environmental Protection Agency. 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factor. Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.6-03. March 25.

Jeffco, 1996 = Jefferson County Parks and Open Space Study, Jefferson County, CO. 1996.

Table 4: Open Space Surface Soil Exposure Scenario RFETS PPRGs

The **Open Space Surface Soil Exposure Scenario** consists of the following pathways: inhalation of surface soil particulates and incidental ingestion of surface soil for an open space visitor who recreates at the site for 30 years including six years as a child. The open space receptor visits the site 100 times per year. This scenario includes only pathways that were evaluated in the Rocky Flats Cleanup Agreement (RFCA) to derive action levels.

Exposure Parameter	Variable	Unit	Value	Source
General Assumptions				
Target hazard index	THI	--	1	EPA, 1991a
Target excess lifetime cancer risk	TR	--	1E-06	EPA, 1991a
Adult body weight	BW	kg	70	EPA, 1991b
Child body weight	BWc	kg	15	EPA, 1991b
Open Space Exposure Scenario Assumptions				
Averaging time - noncarcinogenic	AT_NC	yr	30	EPA, 1991b
Averaging time - carcinogenic	AT_C	yr	70	EPA, 1991b
Exposure time	ET	hr/day	2.5	JeffCo, 1996
Exposure frequency	EF	day/yr	100	JeffCo, 1996
Exposure duration (adult and child, combined)	ED	yr	30	EPA, 1991b
Exposure duration (adult)	EDa	yr	24	EPA, 1991b
Exposure duration (child)	EDc	yr	6	EPA, 1991b
Inhalation rate	IRa_h	m ³ /hr	1.7	EPA, 1997; JeffCo, 1996
Inhalation rate = [IRa_h x ET]	IRa	m ³ /day	4.25	Calculated
Particulate Emission Factor	PEF	m ³ /kg	1.32E+09	EPA, 1996
Soil ingestion rate (adult)	IRs_a	mg/day	50	EPA, 1995
Soil ingestion rate (child)	IRs_c	mg/day	100	(1)
Age-adjusted soil ingestion factor = [(IRs_a x EDa) / BW] + [(IRs_c x EDc) / BWc]	IFs	mg-yr/kg-day	57	EPA, 1991a
Age-adjusted soil ingestion factor - radiation = (IRs_a x EDa) + (IRs_c x EDc)	IFs_RAD	mg-yr/day	1,800	EPA, 1991a
Gamma shielding factor	Se	--	0	EPA, 1991a
Gamma exposure factor (annual) = (EF / 365 day/yr) [a]	Te_A	--	2.74E-01	EPA, 1991a; JeffCo, 1996
Gamma exposure factor (daily) = (ET / 24 hr/day)	Te_D	--	1.04E-01	EPA, 1991a; JeffCo, 1996
Toxicity Values				
Oral reference dose	RfDo	mg/kg-day	chemical-specific	--
Oral slope factor	SFo	(mg/kg-day) ⁻¹	chemical-specific	--
Ingestion slope factor - radiological effects	SF _{ORAD}	risk/pCi	chemical-specific	--
Inhalation reference dose	RfDi	mg/kg-day	chemical-specific	--
Inhalation slope factor	SFi	(mg/kg-day) ⁻¹	chemical-specific	--

Table 4: Open Space Surface Soil Exposure Scenario RFETS PPRGs

Inhalation slope factor - radiological effects	SF _{IRAD}	risk/pCi	chemical-specific	--
External exposure slope factor	SFe	(risk/yr per pCi/g)	chemical-specific	--

Risk-Based PPRG

Open Space Surface Soil Exposure Scenario-Noncarcinogenic Effects

$$\text{PPRG (mg/kg)} = \{(\text{THI} \times \text{AT_NC} \times 365 \text{ d/yr}) / \{ \text{EF} \times \{(\text{IRa} \times \text{ED} \times 1/\text{RfDi} \times 1/\text{BW} \times 1/\text{PEF}) + (1/\text{RfDo} \times 1\text{E-06 kg/mg} \times \text{IFs})\} \}$$

Open Space Surface Soil Exposure Scenario-Carcinogenic Effects

$$\text{PPRG (mg/kg)} = \{(\text{TR} \times \text{AT_C} \times 365\text{d/yr})\} / \text{EF} \times \{(\text{SFi} \times \text{IRa} \times \text{ED} \times 1/\text{BW} \times 1/\text{PEF}) + (1\text{E-06 kg/mg} \times \text{IFs} \times \text{SFo})\}$$

Open Space Surface Soil Exposure Scenario-Radiological Effects

$$\text{PPRG (pCi/g)} = \text{TR} / \{(\text{ED} \times \text{EF} \times \text{IRa} \times \text{SF}_{\text{IRAD}} \times 10^3 \text{ g/kg} \times 1/\text{PEF}) + (\text{EF} \times \text{SF}_{\text{ORAD}} \times 1\text{E-03 g/mg} \times \text{IFs}_{\text{RAD}}) + (\text{ED} \times \text{SFe} \times (1-\text{Se}) \times (\text{Te}_A \times \text{Te}_D))\}$$

Notes:

[a] Extrapolated to calculate annual exposure.

Sources:

(1) Based on the assumption that outdoor ingestion of soil accounts for one-half the daily residential intake (200 mg/day for children, as cited in EPA (1991b)).

EPA, 1991a = U.S. Environmental Protection Agency. 1991. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part B, Development of Risk-Based Preliminary Remediation Goals. Interim. Office of Emergency and Remedial Response, Washington, D.C. Publication 9285.7-01B. December.

EPA, 1991b = U.S. Environmental Protection Agency. 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.6-03. March 25.

EPA, 1995 = U.S. Environmental Protection Agency. Baseline Human Health Risk Assessment for the California Gulch Superfund Site. Part C. Screening-level Soil Concentrations for Workers and Recreational Site Visitors Exposed to Lead and Arsenic. February. Prepared for EPA Region VIII, Denver, CO. by Roy F. Weston, Inc.

EPA, 1996 = U.S. Environmental Protection. 1996. Soil Screening Guidance: Technical Background Document. Office of Emergency and Remedial Response, Washington, D.C. EPA/540/R-95/128. May.

EPA, 1997 = U.S. Environmental Protection Agency. 1997. Exposure Factors Handbook. Office of Research and Development, Washington, D.C. EPA/600/P-95/002Fa. August.

JeffCo, 1996 = Jefferson County Parks and Open Space Study. Jefferson County, CO. 1996.

Table 5: Toxicity Values Used for the RFETS PPRGs

Target Analyte List Chemical		CAS Number	Oral RfD (mg/kg-day)	Oral/Ingestion Slope Factor (mg/kg-day) ⁻¹	Inhal RfC (mg/m3)	Inhalation Unit Risk (m3/μg)	Inhalation RfD (mg/kg-day)	Inhalation Slope Factor (mg/kg-day) ⁻¹	External Slope Factor (risk/yr pCi/g)
Acenaphthene	(V)	83-32-9	6.00E-02						
Acenaphthylene	(V)	208-96-8							
Acetone	(V)	67-64-1	1.00E-01						
Aldrin		309-00-2	3.00E-05	1.70E+01		4.90E-03		1.70E+01 b	
Aluminum		7429-90-5	1.00E+00 y		5.00E-03 y		1.00E-03 y		
Anthracene	(V)	120-12-7	3.00E-01						
Antimony		7440-36-0	4.00E-04						
Aroclor 1016		12674-11-2	7.00E-05	2.00E+00 c,q		5.70E-04 c,q		2.00E+00 c,q	
Aroclor 1221		11104-28-2		2.00E+00 c,q		5.70E-04 c,q		2.00E+00 c,q	
Aroclor 1232		11141-16-5		2.00E+00 c,q		5.70E-04 c,q		2.00E+00 c,q	
Aroclor 1242		53469-21-9		2.00E+00 c,q		5.70E-04 c,q		2.00E+00 c,q	
Aroclor 1248		12672-29-6		2.00E+00 c,q		5.70E-04 c,q		2.00E+00 c,q	
Aroclor 1254		11097-69-1	2.00E-05	2.00E+00 c,q		5.70E-04 c,q		2.00E+00 c,q	
Aroclor 1260		11096-82-5		2.00E+00 c,q		5.70E-04 c,q		2.00E+00 c,q	
Arsenic		7440-38-2	3.00E-04	1.50E+00 i		4.30E-03		1.51E+01	
Barium		7440-39-3	7.00E-02		5.00E-04 b		1.43E-04 b		
Benzene	(V)	71-43-2	3.00E-03 y	2.90E-02	6.00E-03 y	7.80E-06 dd		2.73E-02	
alpha-BHC		319-84-6		6.30E+00		1.80E-03		6.30E+00 b	
beta-BHC		319-85-7		1.80E+00		5.30E-04		1.80E+00 b	
delta-BHC		319-86-8							
gamma-BHC (Lindane)		58-89-9	3.00E-04	1.30E+00 b					
Benzo(a)anthracene		56-55-3		7.30E-01 k		8.80E-02 y		3.10E-01 y	
Benzo(a)pyrene		50-32-8		7.30E+00		8.80E-01 y		3.10E+00 y	
Benzo(b)fluoranthene		205-99-2		7.30E-01 k		8.80E-02 y		3.10E-00 y	
Benzo(g,h,i)perylene		191-24-2							
Benzo(k)fluoranthene		207-08-9		7.30E-02 k		8.80E-03 y		3.10E-02 y	
Benzoic Acid		65-85-0	4.00E+00						
Benzyl Alcohol		100-51-6	3.00E-01 b						
Beryllium		7440-41-7	2.00E-03	4.30E+00 w	2.00E-05	2.40E-03	5.71E-06	8.40E+00 b	
bis(2-chloroethoxy)methane	(V)	111-91-1							
bis(2-chloroethyl)ether	(V)	111-44-4		1.10E+00		3.30E-04		1.10E+00 b	
bis(2-chloroisopropyl)ether	(V)	39638-32-9	4.00E-02	7.00E-02 b,u		1.00E-05 b,u		3.50E-02 b,u	
bis(2-ethylhexyl)phthalate		117-81-7	2.00E-02	1.40E-02				1.40E-02 y	
Bromodichloromethane	(V)	75-27-4	2.00E-02	6.20E-02					
Bromoform	(V)	75-25-2	2.00E-02	7.9E-03		1.10E-06		3.90E-03	
Bromomethane	(V)	74-83-9	1.40E-03		5.00E-03		1.43E-03		
4-Bromophenyl phenyl ether		101-55-3							
2-Butanone	(V)	78-93-3	6.00E-01		1.00E+00		2.86E-01		
Butylbenzylphthalate		85-68-7	2.00E-01						
Cadmium (water)		7440-43-9	5.00E-04 r			1.80E-03		6.30E+00	
Cadmium (food)		7440-43-9	1.00E-03 r		3.00E-04 ee	1.80E-03	8.60E-05 ee	6.30E+00	
Calcium		7440-70-2							

Table 5: Toxicity Values Used for the RFETS PPRGs

Target Analyte List Chemical		CAS Number	Oral RfD (mg/kg-day)	Oral/Ingestion Slope Factor (mg/kg-day) ⁻¹	Inhal RfC (mg/m ³)	Inhalation Unit Risk (m ³ /μg)	Inhalation RfD (mg/kg-day)	Inhalation Slope Factor (mg/kg-day) ⁻¹	External Slope Factor (risk/yr per pCi/g)
Carbon disulfide	(V)	75-15-0	1.00E-01		7.00E-01		2.00E-01		
Carbon tetrachloride	(V)	56-23-5	7.00E-04	1.30E-01	2.00E-03 y	1.05E-05	5.71E-04 y	5.30E-02 b	
Cesium		7440-46-2							
alpha-Chlordane		5103-71-9	5.00E-04 d	3.50E-01 d	7.00E-04 d	1.00E-04 d	2.00E-04 d	3.50E-01 d	
beta-Chlordane		5103-74-2	5.00E-04 d	3.50E-01 d	7.00E-04 d	1.00E-04 d	2.00E-04 d	3.50E-01 d	
gamma-Chlordane		12789-03-6	5.00E-04	3.50E-01	7.00E-04	1.00E-04	2.00E-04	3.50E-01	
4-Chloroaniline		106-47-8	4.00E-03						
Chlorobenzene	(V)	108-90-7	2.00E-02		2.00E-02 b		5.71E-03 b		
Chloroethane	(V)	75-00-3	4.00E-01 y	2.90E-03 y	1.00E+01		2.86E+00		
Chloroform	(V)	67-66-3	1.00E-02	6.10E-03	3.00E-04 y	2.30E-05		8.05E-02	
Chloromethane	(V)	74-87-3		1.30E-02 b		1.80E-06 b		6.30E-03 b	
4-Chloro-3-methylphenol		59-50-7							
2-Chloronaphthalene	(V)	91-58-7	8.00E-02						
2-Chlorophenol	(V)	95-57-8	5.00E-03						
4-Chlorophenyl phenyl ether		7005-72-3							
Chromium III		16065-83-1	1.50E+00				5.71E-07 w,y		
Chromium VI		18540-29-9	3.00E-03		1.00E-04 ff	1.20E-02		4.20E+01	
Chrysene		218-01-9		7.30E-03 k		8.80E-04 y		3.10E-03 y	
Cobalt		7440-48-4	6.00E-02 y,bb						
Copper		7440-50-8	3.70E-02 w,o						
Cyanide		57-12-5	2.00E-02						
4,4-DDD		72-54-8		2.40E-01					
4,4-DDE		72-55-9		3.40E-01					
4,4-DDT		50-29-3	5.00E-04	3.40E-01		9.70E-05		3.40E-01	
Dibenz(a,h)anthracene		53-70-3		7.30E+00 k		8.80E-01 y		3.10E+00 y	
Dibenzofuran		132-64-9	4.00E-03 y						
Dibromochloromethane		124-48-1	2.00E-02	8.40E-02					
Di-n-butylphthalate		84-74-2	1.00E-01						
1,2-Dichlorobenzene	(V)	95-50-1	9.00E-02		2.00E-01 b		5.70E-02		
1,3-Dichlorobenzene	(V)	541-73-1	9.00E-04 y						
1,4-Dichlorobenzene	(V)	106-46-7	3.00E-02 y,cc	2.40E-02 b	8.00E-01		2.30E-01		
3,3-Dichlorobenzidine		91-94-1		4.50E-01					
1,1-Dichloroethane	(V)	75-34-3	1.00E-01 b		5.00E-01 b		1.43E-01		
1,2-Dichloroethane	(V)	107-06-2	3.00E-02 y	9.10E-02	5.00E-03 y	2.60E-05	1.40E-03 y	9.10E-02	
1,1-Dichloroethene	(V)	75-35-4	9.00E-03	6.00E-01		5.00E-05		1.75E-01	
1,2-Dichloroethene (total)	(V)	540-59-0	9.00E-03 b						
2,4-Dichlorophenol		120-83-2	3.00E-03						
1,2-Dichloropropane	(V)	78-87-5		6.80E-02 b	4.00E-03		1.14E-03		
cis-1,3-Dichloropropene	(V)	10061-01-5	3.00E-04 e	1.80E-01 b,e	2.00E-02 e	3.70E-05 b,e	5.71E-03 e	1.30E-01 b,e	
trans-1,3-Dichloropropene	(V)	10061-02-6	3.00E-04 e	1.80E-01 b,e	2.00E-02 e	3.70E-05 b,e	5.71E-03 e	1.30E-01 b,e	
Dieldrin		60-57-1	5.00E-05	1.60E+01		4.60E-03		1.60E+01	
Diethylphthalate		84-66-2	8.00E-01						

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Table 5: Toxicity Values Used for the RfETS PPRGs

Target Analyte List	CAS Number	Oral RfD (mg/kg-day)	Oral/Ingestion Slope Factor (mg/kg-day) ⁻¹	Inhal RfC (mg/m ³)	Inhalation Unit Risk (m ³ /μg)	Inhalation RfD (mg/kg-day)	Inhalation Slope Factor (mg/kg-day) ⁻¹	External Slope Factor (risk/yr per pc/g)
2,4-Dimethylphenol	(V) 105-67-9	2.00E-02	1.00E+01 w,y					
Dimethylphthalate	131-11-3	1.00E-04 y						
4,6-Dinitro-2-methylphenol	(V) 534-52-1	1.00E-04 y						
2,4-Dinitrophenol	51-28-5	2.00E-03						
2,4-Dinitrotoluene	121-14-2	2.00E-03	6.80E-01					
2,6-Dinitrotoluene	606-20-2	1.00E-03 b	6.80E-01					
D,n-octylphthalate	117-84-0	2.00E-02 b	1.40E-02		4.00E-06 y			
Endosulfan I	959-98-8	6.00E-03 z						
Endosulfan II	33213-65-9	6.00E-03 z						
Endosulfan sulfate	1031-07-8	6.00E-03 z						
Endosulfan (technical)	115-29-7	6.00E-03						
Endrin ketone	53494-70-5							
Endrin (technical)	72-20-8	3.00E-04						
Ethylbenzene	100-41-4	1.00E-01		1.00E+00		2.86E-01		
Fluoranthene	206-44-0	4.00E-02						
Fluorene	(V) 86-73-7	4.00E-02						
Hepachlor	76-44-8	5.00E-04	4.50E+00	1.30E-03	1.30E-03	4.50E+00	9.10E+00	4.50E+00
Hepachlor epoxide	1024-57-3	1.30E-05	9.10E+00	2.60E-03	2.60E-03	9.10E+00	1.60E+00	7.70E-02
Hexachlorobenzene	118-74-1	8.00E-04	1.60E+00	4.60E-04	4.60E-04		2.00E-05 b	1.40E-02
Hexachlorobutadiene	87-68-3	2.00E-04 b	7.80E-02	2.20E-05	2.20E-05			
Hexachlorocyclopentadiene	77-47-4	7.00E-03		7.00E-05 b				
Hexachloroethane	67-72-1	1.00E-03	1.40E-02	4.00E-06				
2-Hexanone	(V) 591-78-6				8.80E-02 y		3.10E-01 y	
Indeno(1,2,3-cd)pyrene	193-39-5		7.30E-01 k					
Iron	7439-89-6	3.00E-01 y						
Isophorone	78-59-1	2.00E-01	9.50E-04					
Lead	7439-92-1							
Lithium	7439-93-2	2.00E-02 w,y						
Magnesium	7439-95-4							
Manganese	7439-96-5	4.70E-02 s		5.00E-05		1.43E-05		
Mercury (elemental)	7439-97-6	gg		3.00E-04 b		8.60E-05 l		
Mercuric chloride	72-43-5	5.00E-03						
Methoxychlor								
Methylene chloride	(V) 75-09-2	6.00E-02	7.50E-03	3.00E+00 b	4.70E-07	8.57E-01	1.65E-03	
2-Methylnaphthalene	(V) 91-57-6	2.00E-02 y,aa						
4-Methyl-2-pentanone	(V) 108-10-1	8.00E-02 b		8.00E-02 b		2.29E-02		
2-Methylphenol	95-48-7	5.00E-02						
4-Methylphenol	106-44-5	5.00E-03 b						
Molybdenum	7439-98-7	5.00E-03						
Naphthalene	(V) 91-20-3	2.00E-02		3.00E-03				
Nickel (soluble)	7440-02-0	2.00E-02						
2-Nitroaniline	88-74-4	6.00E-05 w,y		2.00E-04		5.71E-05		

Table 5: Toxicity Values Used for the RFETS PPRGs

Target Analyte List Chemical		CAS Number	Oral RfD (mg/kg-day)	Oral/Ingestion Slope Factor (mg/kg-day) ⁻¹	Inhal RfC (mg/m ³)	Inhalation Unit Risk (m ³ /μg)	Inhalation RfD (mg/kg-day)	Inhalation Slope Factor (mg/kg-day) ⁻¹	External Slope Factor (risk/yr per pCi/g)
3-Nitroaniline		99-09-2							
4-Nitroaniline		100-01-6							
Nitrobenzene	(V)	98-95-3	5.00E-04		2.00E-03 b		5.70E-04 j		
2-Nitrophenol		88-75-5							
4-Nitrophenol	(V)	100-02-7	8.00E-03 y						
n-Nitrosodiphenylamine	(V)	86-30-6		4.90E-03					
n-Nitrosodipropylamine		621-64-7		7.00E+00					
Pentachlorophenol		87-86-5	3.00E-02	1.20E-01					
Phenanthrene	(V)	85-01-8							
Phenol		108-95-2	6.00E-01						
Potassium		7440-09-7							
Pyrene		129-00-0	3.00E-02						
Selenium		7782-49-2	5.00E-03						
Silver		7440-22-4	5.00E-03						
Sodium		7440-23-5							
Strontium		7440-24-6	6.00E-01						
Stryene	(V)	100-42-5	2.00E-01		1.00E+00		2.86E-01		
1,1,2,2-Tetrachloroethane	(V)	79-34-5	6.00E-02 y	2.00E-01		5.80E-05		2.00E-01 b	
Tetrachloroethene	(V)	127-18-4	1.00E-02	5.20E-02 y	6.00E-01 y	5.80E-07 y		2.03E-03 l	
Thallium		7440-28-0							
Tin		7440-31-5	6.00E-01 b						
Toluene	(V)	108-88-3	2.00E-01		4.00E-01		1.14E-01		
Toxaphene		8001-35-2		1.10E+00		3.20E-04		1.10E+00	
1,2,4-Trichlorobenzene	(V)	120-82-1	1.00E-02		2.00E-01 b		5.71E-02 j		
1,1,1-Trichloroethane	(V)	71-55-6	2.80E-01 y		2.20E+00 y		2.86E-01 w,y		
1,1,2-Trichloroethane	(V)	79-00-5	4.00E-03	5.70E-02		1.60E-05		5.60E-02	
Trichloroethene	(V)	79-01-6	6.00E-03 y	1.10E-02 w		1.70E-06 l		6.00E-03 l	
2,4,5-Trichlorophenol		95-95-4	1.00E-01						
2,4,6-Trichlorophenol		88-06-2		1.10E-02		3.10E-06		1.00E-02	
Vanadium		7440-62-2	7.00E-03 b						
Vinyl acetate		108-05-4	1.00E+00 b		2.00E-01		5.71E-02		
Vinyl chloride	(V)	75-01-4		1.90E+00 b		8.40E-05 b		3.00E-01	
Xylene (total)	(V)	1330-20-7	2.00E+00						
Zinc		7440-66-6	3.00E-01						
Nitrate		14797-55-8	1.60E+00						
Nitrite		14797-65-0	1.00E-01						
Sulfide		18496-25-8							
Ammonium (as Ammonia)		7664-41-7	9.70E-01 x		1.00E-01		2.86E-02		
Bicarbonate		71-52-3							
Bromide		24959-67-9							

Table 5: Toxicity Values Used for the RFETS PPRGs

Target Analyte List Chemical	CAS Number	Oral RfD (mg/kg-day)	Oral/Ingestion Slope Factor (mg/kg-day) ⁻¹	Inhal RfC (mg/m ³)	Inhalation Unit Risk (m ³ /μg)	Inhalation RfD (mg/kg-day)	Inhalation Slope Factor (mg/kg-day) ⁻¹	External Slope Factor (risk/yr per pCi/g)
Carbonate	3812-32-6							
Chloride	16887-00-6							
Fluoride (as fluoride)	7782-41-4	6.00E-02						
Orthophosphate	14265-44-2							
Silica (as Si and SiO ₂)	7631-86-9							
Sulfate	14808-79-8							
			(Risk/pCi)				(Risk/pCi)	(Risk/pCi)
Am-241	14596-10-2		3.28E-10 b				3.85E-08 b	4.59E-09 b
Cs-137+D	10045-97-3(+D)		3.16E-11 b				1.91E-11 b	2.09E-06 b
Pu-239	15117-48-3		3.16E-10 b				2.78E-08 b	1.26E-11 b
Pu-240	14119-33-6		3.15E-10 b				2.78E-08 b	1.87E-11 b
Ra-226+D	13982-63-3(+D)		2.96E-10 b				2.75E-09 b	6.74E-06 b
Ra-228+D	15262-20-1(+D)		2.48E-10 b				9.94E-10 b	3.28E-06 b
Sr-89	14158-27-1		1.03E-11 b				3.68E-12 b	5.38E-10 b
Sr-90+D	10098-97-2(+D)		5.59E-11 b				6.93E-11 b	0.00E+00 b
Tritium	10028-17-8		7.15E-14 b				9.59E-14 b	0.00E+00 b
U-233	13968-55-3		4.48E-11 b				1.41E-08 b	3.52E-11 b
U-234	13966-29-5		4.44E-11 b				1.40E-08 b	2.14E-11 b
U-235+D	15117-96-1(+D)		4.70E-11 b				1.30E-08 b	2.65E-07 b
U-238+D	7440-61-1(+D)		6.20E-11 b				1.24E-08 b	6.57E-08 b

Notes:

(V) = Chemicals listed are volatile.

a = All toxicity values and notes are from IRIS, 1999 unless otherwise noted. Several inhalation slope factors have

been derived by multiplying the inhalation unit risk from IRIS by a conversion factor of 3500: [SFI = (Inh Unit Risk x 70kg x 1,000 ug/mg) / 20 m³/d].

Several inhalation reference doses have been derived by multiplying the inhalation reference concentration by a conversion factor of 0.2857: [RfDi = (RfCi x 20 m³/d) / 70 kg].

Several oral slope factors have been derived by multiplying the drinking water unit risk by a conversion factor of 35,000: [SFO = (DW Unit Risk x 70 kg x 1,000 ug/mg) / 2 L/day].

b = Value from HEAST, 1997.

c = Values given are for PCBs.

d = Values given are for chlordane (CAS no. 12789-03-6).

e = Values given are for 1,3-dichloropropene.

i = Value given for arsenic is calculated from an oral unit risk of 5E-05 (L/μg).

j = Values given for chemicals were calculated from HEAST, 1997.

k = Values given for PAHs were found in EPA, 1993.

l = Value given is from an EPA memo from the Office of Research and Development, National Center for Environmental Assessment (NCEA).

o = Value based on the copper drinking water standard of 1.3 mg/L.

q = The upper-bound slope factor for high risk and persistence is recommended by EPA for the oral slope factor of PCB environmental mixtures.

Table 5: Toxicity Values Used for the RFETS PPRGs

r = Dual oral RfDs available for cadmium. 5E-04 is representative of pathways involving water and 1E-03 is representative of pathways involving food (soil).

s = According to IRIS, 1998, the oral RfD of 0.14 represents total oral intake of manganese. It is recommended that a modifying factor of three be applied (resulting oral RfD = 0.047) if oral RfD is used for assessments involving nondietary exposures (ingesting soil or drinking water).

u = Values given for 70 percent bis(2-chloro-1-methyl ethyl) ether and 30 percent bis(2-chloroisopropyl) ether.

w = Value given has been withdrawn by EPA; greater uncertainty is associated with this toxicity value than values listed in IRIS and HEAST.

x = Ammonia oral RfD specifically related to organoleptic threshold.

y = NCEA (as referenced in EPA, 1997).

z = Values given for Endosulfan (technical).

aa = Value is for naphthalene. NCEA, 1999 recommends using the RfD for naphthalene as a surrogate for its methylated derivative, 2-methylnaphthalene until additional studies are available.

bb = Value is upper range of average intake for children, recommended by NCEA, 1999 in lieu of an oral RfD, given the relatively well characterized intake of cobalt in food.

cc = Value given is the higher of two possible provisional RfDs provided by NCEA. Higher value was chosen for more conservatism.

dd = Value given is the high end of the range provided of acceptable URFs. This value was chosen for more conservatism.

ee = Value given is Region VIII EPA RfC for cadmium.

ff = Value given is IRIS RfC for chromium VI in particulates, the likely form in RFETS soils.

gg = Elemental mercury and ionic mercury have been separated to reflect reporting in IRIS.

References:

EPA, 1993 = U.S. Environmental Protection Agency. 1993. Research and Development-Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. Prepared for the Office of Health and Environmental Assessment by the Environmental Criteria and Assessment Office, Office of Health and Environmental Assessment, Cincinnati, OH. Final Draft. ECAO-CIN-842. March.

EPA, 1997 = U.S. Environmental Protection Agency. 1997. Region III Risk-Based Concentration Table. Philadelphia, PA. October 22.

HEAST, 1997 = U.S. Environmental Protection Agency. 1997. Health Effects Assessment Summary Tables, FY-1997 Annual. Office of Solid Waste and Emergency Response, Washington, D.C. EPA/540/R-97/036. July.

IRIS, 1998 = U.S. Environmental Protection Agency. 1998. Integrated Risk Information System. On-line database. Office of Research and Development, Cincinnati, OH. April.

Table 6: Preliminary Risk-Based Remediation Goals for RFETS

Target Analyte List Chemical		CAS Number	Residential Groundwater (mg/L or pCi/L)	Office Worker Soil (mg/kg or pCi/g)	Open Space Surface Water (mg/L or pCi/L)	Open Space Soil (mg/kg or pCi/g)
Acenaphthene	(V)	83-32-9	2.19E+00	1.23E+05	3.07E+02	1.15E+05
Acenaphthylene	(V)	208-96-8	-	-	-	-
Acetone	(V)	67-64-1	3.65E+00	2.04E+05	5.11E+02	1.92E+05
Aldrin		309-00-2	5.01E-06	3.37E-01	7.01E-04	2.64E-01
Aluminum		7429-90-5	3.65E+01	>1E+06	5.11E+03	>1E+06
Anthracene	(V)	120-12-7	1.10E+01	6.13E+05	1.53E+03	5.76E+05
Antimony		7440-36-0	1.46E-02	8.18E+02	2.04E+00	7.68E+02
Aroclor 1016		12674-11-2	4.26E-05	2.86E+00	5.96E-03	2.24E+00
Aroclor 1221		11104-28-2	4.26E-05	2.86E+00	5.96E-03	2.24E+00
Aroclor 1232		11141-16-5	4.26E-05	2.86E+00	5.96E-03	2.24E+00
Aroclor 1242		53469-21-9	4.26E-05	2.86E+00	5.96E-03	2.24E+00
Aroclor 1248		12672-29-6	4.26E-05	2.86E+00	5.96E-03	2.24E+00
Aroclor 1254		11097-69-1	4.26E-05	2.86E+00	5.96E-03	2.24E+00
Aroclor 1260		11096-82-5	4.26E-05	2.86E+00	5.96E-03	2.24E+00
Arsenic		7440-38-2	5.68E-05	3.81E+00	7.95E-03	2.99E+00
Barium		7440-39-3	2.56E+00	1.34E+05	3.58E+02	1.33E+05
Benzene	(V)	71-43-2	2.94E-03	1.97E+02	4.11E-01	1.55E+02
alpha-BHC		319-84-6	1.35E-05	9.08E-01	1.89E-03	7.11E-01
beta-BHC		319-85-7	4.73E-05	3.18E+00	6.62E-03	2.49E+00
delta-BHC		319-86-8	-	-	-	-
gamma-BHC (Lindane)		58-89-9	6.55E-05	4.40E+00	9.17E-03	3.45E+00
Benzo(a)anthracene		56-55-3	1.17E-04	7.84E+00	1.63E-02	6.14E+00
Benzo(a)pyrene		50-32-8	1.17E-05	7.84E-01	1.63E-03	6.14E-01
Benzo(b)fluoranthene		205-99-2	1.17E-04	7.84E+00	1.63E-02	6.14E+00
Benzo(g,h,i)perylene		191-24-2	-	-	-	-
Benzo(k)fluoranthene		207-08-9	1.17E-03	7.84E+01	1.63E-01	6.14E+01
Benzoic Acid		65-85-0	1.46E+02	>1E+06	2.04E+04	>1E+06
Benzyl Alcohol		100-51-6	1.10E+01	6.13E+05	1.53E+03	5.76E+05
Beryllium		7440-41-7	1.98E-05	1.33E+00	2.77E-03	1.04E+00
bis(2-chloroethoxy)methane	(V)	111-91-1	-	-	-	-

Table 6: Preliminary Risk-Based Remediation Goals for RFETS

Target Analyte List Chemical		CAS Number	Residential Groundwater (mg/L or pCi/L)	Office Worker Soil (mg/kg or pCi/g)	Open Space Surface Water (mg/L or pCi/L)	Open Space Soil (mg/kg or pCi/g)
bis(2-chloroethyl)ether	(V)	111-44-4	7.74E-05	5.20E+00	1.08E-02	4.07E+00
bis(2-chloroisopropyl)ether	(V)	39638-32-9	1.22E-03	8.18E+01	1.70E-01	6.40E+01
bis(2-ethylhexyl)phthalate		117-81-7	6.08E-03	4.09E+02	8.52E-01	3.20E+02
Bromodichloromethane	(V)	75-27-4	1.37E-03	9.23E+01	1.92E-01	7.23E+01
Bromoform	(V)	75-25-2	1.08E-02	7.24E+02	1.51E+00	5.67E+02
Bromomethane	(V)	74-83-9	5.11E-02	2.86E+03	7.15E+00	2.69E+03
4-Bromophenyl phenyl ether		101-55-3	-	-	-	-
2-Butanone	(V)	78-93-3	2.19E+01	>1E+06	3.07E+03	>1E+06
Butylbenzylphthalate		85-68-7	7.30E+00	4.09E+05	1.02E+03	3.84E+05
Cadmium (water)		7440-43-9	1.83E-02	NA	2.56E+00	NA
Cadmium (food)		7440-43-9	NA	2.04E+03	5.11E+00	1.92E+03
Calcium		7440-70-2	-	-	-	-
Carbon disulfide	(V)	75-15-0	3.65E+00	2.04E+05	5.11E+02	1.92E+05
Carbon tetrachloride	(V)	56-23-5	6.55E-04	4.40E+01	9.17E-02	3.45E+01
Cesium		7440-46-2	-	-	-	-
alpha-Chlordane		5103-71-9	2.43E-04	1.63E+01	3.41E-02	1.28E+01
beta-Chlordane		5103-74-2	2.43E-04	1.63E+01	3.41E-02	1.28E+01
gamma-Chlordane		12789-03-6	2.43E-04	1.63E+01	3.41E-02	1.28E+01
4-Chloroaniline		106-47-8	1.46E-01	8.18E+03	2.04E+01	7.68E+03
Chlorobenzene	(V)	108-90-7	7.30E-01	4.09E+04	1.02E+02	3.84E+04
Chloroethane	(V)	75-00-3	2.94E-02	1.97E+03	4.11E+00	1.55E+03
Chloroform	(V)	67-66-3	1.40E-02	9.38E+02	1.95E+00	7.35E+02
Chloromethane	(V)	74-87-3	6.55E-03	4.40E+02	9.17E-01	3.45E+02
4-Chloro-3-methylphenol		59-50-7	-	-	-	-
2-Chloronaphthalene	(V)	91-58-7	2.92E+00	1.64E+05	4.09E+02	1.54E+05
2-Chlorophenol	(V)	95-57-8	1.83E-01	1.02E+04	2.56E+01	9.61E+03
4-Chlorophenyl phenyl ether		7005-72-3	-	-	-	-
Chromium III		16065-83-1	5.48E+01	8.73E+03	7.67E+03	4.46E+04
Chromium VI		18540-29-9	1.10E-01	1.02E+03	1.53E+01	4.41E+03
Chrysene		218-01-9	1.17E-02	7.84E+02	1.63E+00	6.14E+02
Cobalt		7440-48-4	2.19E+00	1.23E+01	3.07E+02	1.15E+05
Copper		7440-50-8	1.35E+00	7.56E+04	1.89E+02	7.11E+04

Table 6: Preliminary Risk-Based Remediation Goals for RFETS

Target Analyte List Chemical		CAS Number	Residential Groundwater (mg/L or pCi/L)	Office Worker Soil (mg/kg or pCi/g)	Open Space Surface Water (mg/L or pCi/L)	Open Space Soil (mg/kg or pCi/g)
Cyanide		57-12-5	7.30E-01	4.09E+04	1.02E+02	3.84E+04
4,4-DDD		72-54-8	3.55E-04	2.38E+01	4.97E-02	1.87E+01
4,4-DDE		72-55-9	2.50E-04	1.68E+01	3.51E-02	1.32E+01
4,4-DDT		50-29-3	2.50E-04	1.68E+01	3.51E-02	1.32E+01
Dibenz(a,h)anthracene		53-70-3	1.17E-05	7.84E-01	1.63E-03	6.14E-01
Dibenzofuran		132-64-9	1.46E-01	8.18E+03	2.04E+01	7.68E+03
Dibromochloromethane		124-48-1	1.01E-03	6.81E+01	1.42E-01	5.34E+01
Di-n-butylphthalate		84-74-2	3.65E+00	2.04E+05	5.11E+02	1.92E+05
1,2-Dichlorobenzene	(V)	95-50-1	3.29E+00	1.84E+05	4.60E+02	1.73E+05
1,3-Dichlorobenzene	(V)	541-73-1	3.29E-02	1.84E+03	4.60E+00	1.73E+03
1,4-Dichlorobenzene	(V)	106-46-7	3.55E-03	2.38E+02	4.97E-01	1.87E+02
3,3-Dichlorobenzidine		91-94-1	1.89E-04	1.27E+01	2.65E-02	9.96E+00
1,1-Dichloroethane	(V)	75-34-3	3.65E+00	2.04E+05	5.11E+02	1.92E+05
1,2-Dichloroethane	(V)	107-06-2	9.36E-04	6.29E+01	1.31E-01	4.93E+01
1,1-Dichloroethene	(V)	75-35-4	1.42E-04	9.54E+00	1.99E-02	7.47E+00
1,2-Dichloroethene (total)	(V)	540-59-0	3.29E-01	1.84E+04	4.60E+01	1.73E+04
2,4-Dichlorophenol	(V)	120-83-2	1.10E-01	6.13E+03	1.53E+01	5.76E+03
1,2-Dichloropropane	(V)	78-87-5	1.25E-03	8.42E+01	1.75E-01	6.59E+01
cis-1,3-Dichloropropene	(V)	10061-01-5	4.73E-04	3.18E+01	6.62E-02	2.49E+01
trans-1,3-Dichloropropene	(V)	10061-02-6	4.73E-04	3.18E+01	6.62E-02	2.49E+01
Dieldrin		60-57-1	5.32E-06	3.58E-01	7.45E-04	2.80E-01
Diethylphthalate		84-66-2	2.92E+01	>1E+06	4.09E+03	>1E+06
2,4-Dimethylphenol	(V)	105-67-9	7.30E-01	4.09E+04	1.02E+02	3.84E+04
Dimethylphthalate		131-11-3	3.65E+02	>1E+06	5.11E+04	>1E+06
4,6-Dinitro-2-methylphenol	(V)	534-52-1	3.65E-03	2.04E+02	5.11E-01	1.92E+02
2,4-Dinitrophenol	(V)	51-28-5	7.30E-02	4.09E+03	1.02E+01	3.84E+03
2,4-Dinitrotoluene		121-14-2	1.25E-04	8.42E+00	1.75E-02	6.59E+00
2,6-Dinitrotoluene		606-20-2	1.25E-04	8.42E+00	1.75E-02	6.59E+00
Di-n-octylphthalate		117-84-0	6.08E-03	4.09E+02	8.52E-01	3.20E+02
Endosulfan I		959-98-8	2.19E-01	1.23E+04	3.07E+01	1.15E+04
Endosulfan II		33213-65-9	2.19E-01	1.23E+04	3.07E+01	1.15E+04
Endosulfan sulfate		1031-07-8	2.19E-01	1.23E+04	3.07E+01	1.15E+04

Table 6: Preliminary Risk-Based Remediation Goals for RFETS

Target Analyte List Chemical		CAS Number	Residential Groundwater (mg/L or pCi/L)	Office Worker Soil (mg/kg or pCi/g)	Open Space Surface Water (mg/L or pCi/L)	Open Space Soil (mg/kg or pCi/g)
Endosulfan (technical)		115-29-7	2.19E-01	1.23E+04	3.07E+01	1.15E+04
Endrin ketone		53494-70-5	-	-	-	-
Endrin (technical)		72-20-8	1.10E-02	6.13E+02	1.53E+00	5.76E+02
Ethylbenzene	(V)	100-41-4	3.65E+00	2.04E+05	5.11E+02	1.92E+05
Fluoranthene		206-44-0	1.46E+00	8.18E+04	2.04E+02	7.68E+04
Fluorene	(V)	86-73-7	1.46E+00	8.18E+04	2.04E+02	7.68E+04
Heptachlor		76-44-8	1.89E-05	1.27E+00	2.65E-03	9.96E-01
Heptachlor epoxide		1024-57-3	9.36E-06	6.29E-01	1.31E-03	4.93E-01
Hexachlorobenzene		118-74-1	5.32E-05	3.58E+00	7.45E-03	2.80E+00
Hexachlorobutadiene		87-68-3	1.09E-03	7.34E+01	1.53E-01	5.75E+01
Hexachlorocyclopentadiene		77-47-4	2.56E-01	1.37E+04	3.58E+01	1.33E+04
Hexachloroethane		67-72-1	6.08E-03	4.09E+02	8.52E-01	3.20E+02
2-Hexanone	(V)	591-78-6	-	-	-	-
Indeno(1,2,3-cd)pyrene		193-39-5	1.17E-04	7.84E+00	1.63E-02	6.14E+00
Iron		7439-89-6	1.10E+01	6.13E+05	1.53E+03	5.76E+05
Isophorone		78-59-1	8.96E-02	6.02E+03	1.26E+01	4.72E+03
Lead		7439-92-1	-	1.00E+03 [a]	-	-
Lithium		7439-93-2	7.30E-01	4.09E+04	1.02E+02	3.84E+04
Magnesium		7439-95-4	-	-	-	-
Manganese		7439-96-5	1.72E+00	6.68E+04	2.40E+02	8.36E+04
Mercury (elemental)		7439-97-6	-	>1E+06	-	>1E+06
Mercuric chloride	[b]		1.10E-02	6.13E+02	1.53E+00	5.76E+02
Methoxychlor		72-43-5	1.83E-01	1.02E+04	2.56E+01	9.61E+03
Methylene chloride	(V)	75-09-2	1.14E-02	7.63E+02	1.59E+00	5.98E+02
2-Methylnaphthalene	(V)	91-57-6	7.30E-01	4.09E+04	1.02E+02	3.84E+04
4-Methyl-2-pentanone	(V)	108-10-1	2.92E+00	1.64E+05	4.09E+02	1.54E+05
2-Methylphenol		95-48-7	1.83E+00	1.02E+05	2.56E+02	9.61E+04
4-Methylphenol		106-44-5	1.83E-01	1.02E+04	2.56E+01	9.61E+03
Molybdenum		7439-98-7	1.83E-01	1.02E+04	2.56E+01	9.61E+03
Naphthalene	(V)	91-20-3	7.30E-01	4.09E+04	1.02E+02	3.84E+04
Nickel (soluble)		7440-02-0	7.30E-01	4.09E+04	1.02E+02	3.84E+04
2-Nitroaniline		88-74-4	2.19E-03	1.23E+02	3.07E-01	1.15E+02

Table 6: Preliminary Risk-Based Remediation Goals for RFETS

Target Analyte List Chemical		CAS Number	Residential Groundwater (mg/L or pCi/L)	Office Worker Soil (mg/kg or pCi/g)	Open Space Surface Water (mg/L or pCi/L)	Open Space Soil (mg/kg or pCi/g)
3-Nitroaniline		99-09-2	-	-	-	-
4-Nitroaniline		100-01-6	-	-	-	-
Nitrobenzene	(V)	98-95-3	1.83E-02	1.02E+03	2.56E+00	9.61E+02
2-Nitrophenol		88-75-5	-	-	-	-
4-Nitrophenol	(V)	100-02-7	2.92E-01	1.64E+04	4.09E+01	1.54E+04
n-Nitrosodiphenylamine	(V)	86-30-6	1.74E-02	1.17E+03	2.43E+00	9.15E+02
n-Nitrosodipropylamine	(V)	621-64-7	1.22E-05	8.18E-01	1.70E-03	6.40E-01
Pentachlorophenol		87-86-5	7.10E-04	4.77E+01	9.94E-02	3.74E+01
Phenanthrene	(V)	85-01-8	-	-	-	-
Phenol		108-95-2	2.19E+01	>1E+06	3.07E+03	>1E+06
Potassium		7440-09-7	-	-	-	-
Pyrene		129-00-0	1.10E+00	6.13E+04	1.53E+02	5.76E+04
Selenium		7782-49-2	1.83E-01	1.02E+04	2.56E+01	9.61E+03
Silver		7440-22-4	1.83E-01	1.02E+04	2.56E+01	9.61E+03
Sodium		7440-23-5	-	-	-	-
Strontium		7440-24-6	2.19E+01	>1E+06	3.07E+03	>1E+06
Stryene	(V)	100-42-5	7.30E+00	4.09E+05	1.02E+03	3.84E+05
1,1,2,2-Tetrachloroethane	(V)	79-34-5	4.26E-04	2.86E+01	5.96E-02	2.24E+01
Tetrachloroethene	(V)	127-18-4	1.64E-03	1.10E+02	2.29E-01	8.62E+01
Thallium		7440-28-0	-	-	-	-
Tin		7440-31-5	2.19E+01	>1E+06	3.07E+03	>1E+06
Toluene	(V)	108-88-3	7.30E+00	4.09E+05	1.02E+03	3.84E+05
Toxaphene		8001-35-2	7.74E-05	5.20E+00	1.08E-02	4.07E+00
1,2,4-Trichlorobenzene	(V)	120-82-1	3.65E-01	2.04E+04	5.11E+01	1.92E+04
1,1,1-Trichloroethane	(V)	71-55-6	1.02E+01	5.72E+05	1.43E+03	5.38E+05
1,1,2-Trichloroethane	(V)	79-00-5	1.49E-03	1.00E+02	2.09E-01	7.86E+01
Trichloroethene	(V)	79-01-6	7.74E-03	5.20E+02	1.08E+00	4.07E+02
2,4,5-Trichlorophenol		95-95-4	3.65E+00	2.04E+05	5.11E+02	1.92E+05
2,4,6-Trichlorophenol		88-06-2	7.74E-03	5.20E+02	1.08E+00	4.07E+02
Vanadium		7440-62-2	2.56E-01	1.43E+04	3.58E+01	1.34E+04
Vinyl acetate		108-05-4	3.65E+01	>1E+06	5.11E+03	>1E+06
Vinyl chloride	(V)	75-01-4	4.48E-05	3.01E+00	6.28E-03	2.36E+00

Table 6: Preliminary Risk-Based Remediation Goals for RFETS

Target Analyte List Chemical		CAS Number	Residential Groundwater (mg/L or pCi/L)	Office Worker Soil (mg/kg or pCi/g)	Open Space Surface Water (mg/L or pCi/L)	Open Space Soil (mg/kg or pCi/g)
Xylene (total)	(V)	1330-20-7	7.30E+01	>1E+06	1.02E+04	>1E+06
Zinc		7440-66-6	1.10E+01	6.13E+05	1.53E+03	5.76E+05
Nitrate		14797-55-8	5.84E+01	>1E+06	8.18E+03	>1E+06
Nitrite		14797-65-0	3.65E+00	2.04E+05	5.11E+02	1.92E+05
Sulfide		18496-25-8	-	-	-	-
Ammonium (as Ammonia)		7664-41-7	3.54E+01	>1E+06	4.96E+03	>1E+06
Bicarbonate		71-52-3	-	-	-	-
Bromide		24959-67-9	-	-	-	-
Carbonate		3812-32-6	-	-	-	-
Chloride		16887-00-6	-	-	-	-
Fluoride (as fluorine)		7782-41-4	2.19E+00	1.23E+05	3.07E+02	1.15E+05
Orthophosphate		14265-44-2	-	-	-	-
Silica (as Si and SiO ₂)		7631-86-9	-	-	-	-
Sulfate		14808-79-8	-	-	-	-
Am-241		14596-10-2	1.45E-01	8.00E+00	2.03E+01	1.58E+01
Cs-137+D		10045-97-3(+D)	1.51E+00	1.05E-01	2.11E+02	5.57E-01
Pu-239		15117-48-3	1.51E-01	1.00E+01	2.11E+01	1.75E+01
Pu-240		14119-33-6	1.51E-01	1.00E+01	2.12E+01	1.75E+01
Ra-226+D		13982-63-3(+D)	1.61E-01	3.24E-02	2.25E+01	1.72E-01
Ra-228+D		15262-20-1(+D)	1.92E-01	6.64E-02	2.69E+01	3.51E-01
Sr-89		14158-27-1	4.62E+00	1.76E+02	6.47E+02	4.32E+02
Sr-90+D		10098-97-2(+D)	8.52E-01	5.72E+01	1.19E+02	9.94E+01
Tritium		10028-17-8	6.66E+02	4.47E+04	9.32E+04	7.77E+04
U-233		13968-55-3	1.06E+00	6.78E+01	1.49E+02	1.22E+02
U-234		13966-29-5	1.07E+00	6.87E+01	1.50E+02	1.23E+02
U-235+D		15117-96-1(+D)	1.01E+00	8.16E-01	1.42E+02	4.25E+00
U-238+D		7440-61-1(+D)	7.68E-01	3.13E+00	1.08E+02	1.48E+01

Table 6: Preliminary Risk-Based Remediation Goals for RFETS

Notes:

(V) = Chemicals listed are volatile.

- = No toxicity value available.

NA = PPRG value is not applicable for this exposure scenario. Dual oral RfDs available for cadmium. The first value (5E-04) is representative of pathways involving water and the second value (1E-03) is representative of pathways involving food (soil).

[a] U.S. Environmental Protection Agency (EPA). 1994. Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities. Office of Solid Waste and Emergency Response, Washington, D.C. Directive 9355.4-12.

[b] The value for residential groundwater ingestion is based on the oral RfD for mercuric chloride since an oral toxicity factor is lacking for elemental mercury.



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Appendix O

**PROCESS DESCRIPTION FOR EVALUATING GROUNDWATER
IMPACTS TO SURFACE WATER AND ECOLOGICAL
RESOURCES**

APPENDIX O

Process Description for Evaluating Groundwater Impacts to Surface Water and Ecological Resources

1.0 INTRODUCTION

The purpose of this appendix is to provide a "process description" to integrate the goals and objectives of groundwater monitoring, hydrogeologic characterization, and remedial actions at RFETS. The intent of this process description is not to prescribe specific analyses that must be performed, but to present a general approach that defines how groundwater contamination at RFETS will be assessed and addressed. By developing an integrated process, it is expected that the basis for decisions regarding the need for remediation and the evaluation of remediation performance will be consistent and will effectively protect surface water and ecological resources. A description of the groundwater plume management and remediation strategy is provided in the IMP Background Document. This appendix encompasses the content of the strategy in the IMP.

In essence, the groundwater contamination assessment and remediation evaluation process consists of the following phases:

- Initial determination of actual or potential groundwater contamination
- Development of a conceptual model based on adequate characterization of the source, nature, and extent of groundwater contamination
- Evaluation of whether contaminated groundwater has or will adversely impact surface water and ecological resources
- Evaluation of alternatives for mitigating groundwater contamination which impacts surface water or ecological resources, and the selection of an appropriate remedial action
- Verification of the appropriateness or effectiveness of the selected remedial action

In the following sections, each of these phases is discussed in more detail.

1.1 INITIAL DETERMINATION OF GROUNDWATER CONTAMINATION

This phase is intended to determine whether there is a potential contamination problem. During this phase, no attempt will be made to determine the cause of contamination or how the groundwater contamination is distributed. The evaluation of the presence of groundwater contamination, and if the contamination could impact surface water, is the first threshold when determining if further action is required.

Previous groundwater monitoring programs such as the OU RI/RFI and site-wide characterization activities have made an initial determination of the areas where groundwater is

contaminated. The IMP provides for continued monitoring to assess changes in these areas of groundwater contamination and to identify new problem areas.

1.2 CHARACTERIZATION OF THE GROUNDWATER CONTAMINATION AREA (PLUME EVALUATION)

The primary purpose for characterizing and evaluating the nature and extent of groundwater contamination is to obtain sufficient data to support the development of a conceptual model of the problem area and to support the analyses necessary to evaluate the impact to surface water or ecological resources. Characterization may include, but is not limited to:

- Defining the extent of groundwater contamination
- Identifying potential source areas and contaminants of concern
- Defining plume extent through determining the linear and areal extents of the pathway through subsurface correlation of standard thickness and permeable lithologies
- Recharge and discharge through quantification of water balance, velocity, gradient, and direction of groundwater flow
- Concentration loadings and mass flux of contaminants to surface water
- Effects due to seasonal variations, natural attenuation of contaminants, or changes in discharge due to construction/removal of containment structures, treatment systems or removal of sources

Decisions with respect to plume evaluations will be made with consultation from the groundwater workgroup during various stages of the process. Results of the characterizations will be used to update the ER ranking process under RFCA to ensure that the available budget will be allocated to areas with the highest potential for contamination.

1.2.1 Evaluation of Existing Data

Once the available data have been compiled they can be used to develop a conceptual model of the groundwater contamination area. As the conceptual model is being formulated, ongoing evaluations will be performed to determine whether the data set is of sufficient quantity and quality to support the conceptual model. Some of the questions that should be answered include:

- Are the types of data adequate for the conceptual model (e.g., hydraulic conductivity, stratigraphic, and geologic, piezometric, water quality analyses for the contaminants of concern)
- Is the quantity of data sufficient (e.g., spatial or temporal coverage)
- Is the quality of the data set sufficient to address the program objectives (e.g., use of accepted analytical methods, meeting QA/QC objectives)

If a consideration of these questions shows that the available data are inadequate, then additional data should be collected to fill the data gaps.

1.2.2 Collection of Additional Data

Prior to collecting any additional data, the DQOs should be defined to provide a clear purpose for collecting the additional characterization data. For example, an objective might be to better delineate groundwater flow direction, or to determine concentration trends within specific wells. Once the DQOs have been defined, then the appropriate sampling program may be developed and implemented. At this stage, the new data are incorporated and the conceptual model refined. The data questions outlined above should be addressed to determine whether the conceptual model is valid.

1.2.3 Establishing Baseline Conditions

The baseline assessment may have either of two purposes. The first purpose is to establish the current level of impacts to surface water or ecological resources. The second purpose may be to establish hydrogeologic conditions at specified locations prior to, during, or immediately after remediation.

In the first instance, the baseline case is used to determine whether changes in upgradient conditions will have an adverse or beneficial impact on downgradient surface water or ecological resources. In addition, the first type of baseline case can factor into the decision whether remediation or continued monitoring is the appropriate course of action to protect surface water or ecological resources. In the second instance, the baseline assessment will be the basis for evaluating how downgradient conditions change in response to upgradient remedial actions.

1.3 EVALUATION OF IMPACTS TO SURFACE WATER OR ECOLOGICAL RESOURCES

Pursuant to the RFCA, "[p]rotection of all surface water uses with respect to fulfillment of the Intermediate and Long-Term Site Conditions will be the basis for making soil and ground water remediation and management decisions." Therefore, it is necessary to evaluate the current and future impacts of groundwater on surface water or ecological resources to ensure that these resources are protected.

The evaluation of impacts to surface water will focus on three areas: the direct discharge of groundwater or seeps to surface water; the impact of groundwater to a specified reach of the stream (surface water and alluvium) downgradient from the point of discharge; and the concentration of contaminants at downstream surface water monitoring locations.

Ecological impact assessments will be based on site-specific conditions. The impact evaluations may either be supported directly by the data, by the use of analytical methods, or, if necessary, through the application of numerical models. The determination of which method of analysis to use will be based on the issues that are to be addressed, the limitations inherent in the data, the accuracy of the desired results, or available resources.

1.4 EVALUATION OF ALTERNATIVE REMEDIAL ACTIONS

Upon determination that contaminated groundwater has or may potentially impact surface water or ecological resources, alternative remediation scenarios should be evaluated. Alternative remedial actions include, but are not limited to:

- No action
- Source removal
- Source containment
- Plume containment
- Plume interception

Alternatives will be developed and considered on a site-by-site basis. The evaluation of alternatives will generally consist of the following steps:

- Definition of remediation objectives
- Determination of whether the data and conceptual model will support the analyses necessary to evaluate the different alternatives
- Completion of an alternatives assessment including the evaluation of surface-water or ecological impacts during remedy implementation, and in the future, considering the compatibility with other RFETS closure activities
- Selection of an alternative that is protective of surface water and ecological resources

The results of the alternatives analysis will be presented in a RFCA decision document. In essence, the documentation should summarize:

- The conceptual model describing hydrogeologic conditions
- The analytical tools used to evaluate the data
- The basis for selecting the parameters used for assessing system performance
- The type of impact, if any, to surface water or ecological resources
- How impacts have changed and may change with time
- The assessment of alternatives if remedial action is necessary
- Outline of remedial design/construction and/or monitoring actions as necessary

Development and consideration of alternatives will involve consultation with the groundwater working group during key phases of the process. Within this context, the parties should reach a consensus regarding specific contaminant source areas, groundwater plumes, and the appropriate response. Once an alternative has been selected, a remediation/management project will be developed with its own scope, schedule, and budget.

1.5 REMEDIAL DESIGN/CONSTRUCTION

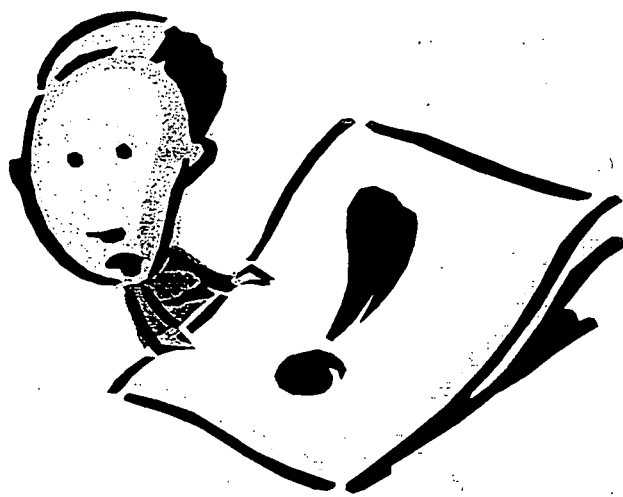
If a remedial action decision has been reached, additional information may be needed to aid the design and construction of the remedial system. A DQO process, as defined in the IMP, will be employed to establish the decision, and data needs to aid in the construction of the remedial system. The remedial system may consist of a groundwater containment or treatment system, or a source removal action. Components of this step may include:

- Preparation and presentation of design documents and construction workplans
- Preparation and presentation of additional sampling and analysis plans
- Determination of performance monitoring requirements

Development and consideration of alternatives will involve consultation with the groundwater workgroup during key phases of the project.

1.6 VERIFICATION OF THE SELECTED REMEDIAL ACTION

Once a selected remedial action has been implemented, it may be necessary to demonstrate that the action meets the prescribed remediation goals. To verify the adequacy of a remedial action, the performance criteria must be clearly defined. For example, the performance criteria for a source removal remedy would be quite different than the performance criteria for a plume intercept remedy. The effectiveness of the former could be easily demonstrated by a trend showing a reduction with time of contaminant concentrations in and immediately downgradient of the remediated area; whereas the effectiveness of a plume intercept system might be evaluated relative to water quality criteria at a point of compliance. The performance criteria will need to be defined on a case-by-case basis, accounting for the site- and contaminant-specific characteristics of different plumes. Decisions will require consultation of the groundwater working group during key phases of the evaluation, and performance monitoring will be implemented through the IMP process.



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Appendix P

**METHODOLOGY FOR UPDATED ENVIRONMENTAL
RESTORATION RANKING**

APPENDIX P

METHODOLOGY FOR UPDATED ENVIRONMENTAL RESTORATION RANKING

1.0 FISCAL YEAR 1996 - UPDATE ENVIRONMENTAL RESTORATION RANKING

This document presents the fiscal year 1996 (FY96) update to the methodology presented in the RFCA Attachment 4, which contains the 1995 prioritized list of ER sites developed to select the top priority sites for remediation (DOE, 1995a). The ER ranking was developed to be used as an aid in planning and prioritizing remedial actions at RFETS. The sequence of remediation activities at RFETS has generally followed the prioritization. Other factors that also influence the remediation sequence are funding, project cost, resource availability, data sufficiency, and integration with other remedial and Site activities. Prioritization accelerates the cleanup process of the worst sites first, and more quickly reduces risks to human health and the environment. The prioritization of cleanup targets also results in cost reductions by allowing better planning, and more efficient utilization of resources.

The 1995 prioritization methodology was developed by a working group of the EPA, CDPHE, DOE, Kaiser-Hill, and RMRS staff and was implemented by RMRS. The result was a prioritized list of ER sites, including a list of ranked sites that require more information (DOE, 1995a). In accordance with RFCA Attachment 4, the ranking has been updated during FY96. The evaluation process is essentially the same as was used in the September 1995 ranking, with the following exceptions:

- ALF for Surface Water, Groundwater, and Soils (RFCA Attachment 5) values were used
- The scoring scale was adjusted to reflect the greater range in ALF ratios
- Impact to surface water was evaluated instead of mobility
- A professional judgment factor was added to account for process knowledge
- Groundwater plumes were evaluated and ranked separately from the contaminant source
- The secondary evaluation, which included project cost and schedule estimates, has been omitted due to other planning activities ongoing at the RFETS

1.1 METHODOLOGY

The ranking process detailed in RFCA Attachment 4 was slightly modified in 1996 to incorporate the ALF and process knowledge. This ranking was generated by using concentrations of contaminants present at different sites, action levels for the appropriate media and location, and factors for impact to surface water, potential for further release, and professional judgment to develop a score for each site. The scores were then ranked to determine which sites have the highest priority. This methodology is conservative and is used only to generate a list to prioritize remedial actions, and pre-remediation investigations. It is not meant to replace a formal risk assessment.

Ecological risk was also considered during the ranking. The recently completed ecological risk assessment was considered during evaluation of the Buffer Zone. There is no unacceptable ecological risk from Buffer Zone IHSSs under present conditions and exposure pathways. An ecological risk assessment has not been completed for the Industrial Area. Ecological factors were not considered when ranking IHSSs in this area.

The following steps were used in the 1996 ranking process:

- The existing analytical data were compared to background data
- Data exceeding background were compared to the ALF values
- Ratios of Tier II ALF values to contaminant concentrations/activities were used for the ranking, unless Tier II values were not available
- A column was added to the ranking sheet to note Tier I exceedances
- The resulting ratios were converted to a score of 1 to 10
- The impact to surface water was evaluated, and assigned a factor of 1 to 3
- The potential for further release was evaluated, and a factor of 1 to 3 applied
- Process knowledge of the site was evaluated, and a professional judgment factor of 0.5 to 2 applied
- The results of the previous steps were multiplied to generate a score per site; this score was used to rank the ER sites

Analytical data in the SWD from 1990 to the present were evaluated for three media; surface soils, subsurface soils, and groundwater. The analytical data were extracted from the SWD and compiled into data sets by media and analytical suite. The media-specific analytical data were compared to the media- and chemical-specific background mean plus two standard deviations (M2SD). All data above the background M2SD were then compared to the appropriate ALF values in RFCA. The draft radiological ALF values for surface soils (See Appendix L) were applied to both surface and subsurface soils. The ALF values for metals in subsurface soils were not agreed upon in time to be included in the 1996 ranking and metals data from subsurface soils were not used in the ranking. A review of the data suggests that this will not effect the ranking significantly.

All exceedances of the values were tabulated for groundwater, subsurface soils, and surface soils at each sample location. The locations were plotted on maps using available survey information. Where no survey data is available, approximate locations were derived from work plan maps. The sample locations were assigned to areas-of-concern, IHSSs, and groundwater plumes based on the media, location of the exceedance, and the analyte.

Media Specific Evaluations

Groundwater - Sitewide groundwater data were compared to background M2SD values presented in the 1993 *Background Geochemical Characterization Report* (DOE, 1993a). Groundwater data were then compared to the ALF values. All well locations where a chemical concentration exceeds a ALF value were plotted. The locations were then associated with the

most probable source area and known groundwater plumes. Ratios of analyte concentrations to the Tier II ALF values were used in the scoring.

Subsurface Soil - All available subsurface soil data collected since 1990 were compared to subsurface soil background M2SD values (DOE, 1993a). The data for volatile organic compounds were compared to the ALF values the radiological activities were compared to the surface soil ALF values. The ALF values for metals in subsurface soils are in ALF. The locations of all borings where a chemical concentration exceeded an ALF value were plotted and associated with the most likely source area.

Surface Soil - All available surface soil data for metals and radiologicals were compared to M2SD background values computed from data presented in the *Geochemical Characterization of Background Surficial Soils, Background Soils Characterization Program, May 1995* (DOE, 1995c). The inorganic and radiological results above background and all data for organic compounds were compared to the ALF values for surface soil. Within the boundaries of the Industrial Area OU, the surface soil data were compared to office worker ALF values. In the Buffer Zone OU, the surface soil data were compared to open space ALF values. The ALF exceedances were plotted to determine the most likely source area, IHSS or group of IHSSs, using the most common wind patterns. Ratios of analyte concentrations to the Tier II ALF values were used in the scoring.

Chemical Score Tabulation

All ALF exceedances were tabulated by IHSS, group of IHSSs, or source area. The chemical score was calculated for each media, within each site, by adding the maximum ratio for each analyte per media. The groundwater, subsurface soil, and surface soil scores were then summed to generate a total score per site. This is a conservative approach that allows the sites to be judged on a uniform basis.

A separate score was derived for each groundwater plume by evaluating only the groundwater exceedances. A risk score was calculated for each plume, as above, by adding the maximum ALF ratios for groundwater contaminants associated with all sites within the estimated plume area. This method results in groundwater being used twice; once in the scoring of sources, and again for the scoring of groundwater plumes. The total chemical scores were graded according to the following table so that the risk component of the ranking system would be weighted similarly to the other components. This table has been adjusted from the 1995 methodology due to the increase in the range of the scores.

Total Chemical Score	ALF Score
>20001	10
10001-20000	9
5001-10000	8
1001-5000	7
501-1000	6
251-500	5
126-250	4
75-125	3
26-75	2
1-25	1

Surface Water Impacts

The impact of contamination at a site on surface water quality was evaluated and each site was assigned a factor of 1 to 3 to indicate the impact on surface water from each site. The impact to surface water factors were assigned on a scale of 1 to 3 as follows:

1. Contaminants that are immobile in the environment or for which there is no pathway to surface water. Radionuclides and metals were given a score of one unless adjacent to surface water, or on a steep slope bordering surface water. This rating was used where engineered structures are in place that prevent the spread of contaminants.
2. This rating was applied where contaminants have or are expected to have an impact on surface water at the Tier II ALF level (MCL).
3. This rating will apply where there is a documented or probable impact to surface water above the Tier I ALF value (100 x MCL).

Potential for Further Release

This factor takes into account the potential for additional release of contaminants into the environment and includes cross-media movement of contaminants within the environment. Sites were assigned a value of 1 to 3 based on the following criteria:

1. Assigned to a location when contamination were not present as free product, very high concentrations, and/or show no cross contamination of environmental media.
2. Any location where free product may be present in the ground and/or where there is a potential for cross contamination.

3. Locations where there is indication or certainty that free product exists in the ground, were significant levels of contamination exist, and/or where cross contamination of environmental media is present.

Professional Judgment

A professional judgment factor was added to the FY97's ranking based on process knowledge not represented by the other factors. The reasons for assigning the professional judgment factor are given in the comment column of the ranking. The values for this factor are:

- 0.5 The ranking overestimates the priority of a site. This was used if a risk assessment or conservative screen has been completed indicating an acceptable risk, but the site ranks high on the priority listing.
- 1 The ranking reflects process knowledge of a site.
- 2 The ranking underestimates the priority of a site.. This may be due to a lack of data, coupled with process knowledge of significant releases.

Total Score and Ranking

The total score was calculated by multiplying the ALF score times the impact to surface water, potential for further release, and professional judgment factors. A formal risk assessment is a more precise evaluation of the same data, and, where risk assessment data exist, they were used to refine the ranking of the sites through the use of the professional judgment factor.

Where insufficient data currently exist to rank sites, these sites were assigned to the category of needs further investigation (INV) and ranked using the professional judgment factor. This placed them on the ranking above known low-risk sites. As data become available, the ranking for these sites will be updated.

The Solar Ponds groundwater score was calculated without using data from an upgradient well which shows the effects of an upgradient plume. Instead, this well was used in the calculations for the groundwater score for IHSS 118.1 and the carbon tetrachloride spill plume.

Where analytical data and process knowledge indicate that there are localized areas of contamination, the associated data were eliminated from site evaluation, and assigned to a hot spot list. These sites will be evaluated to verify that these are hot spots. Most of the localized extent sites are PCB sites, including a PCB site in IHSS 150.6 and those surrounding Bowman's Pond. The Old Landfill has analytical data indicating the presence of small radiological anomalies at the surface. Best management practices will be used on these hot spots as part of the final remedy for the Original Landfill.

Radium 226 and 228 data were not evaluated for the following reasons:

- Radium 226 and 228 are not listed as having been used at RFETS in either the *Historical Release Report* (DOE, 1992a) or the *Project Task 3/4 Report: Reconstruction of Historical Rocky Flats Operations and Identification of Release Points* (ChemRisk, 1992)
- The decay chains and half-lives of decay products make it highly unlikely that significant amounts of radium 226 or 228 would have accumulated by radioactive decay of radionuclides known to have been used at RFETS
- The soils and groundwater in the foothills to the west of RFETS are known to have high levels of both uranium (total) and radium 226
- The background amount for radium 226 in surface soil has a PPRG ratio of 48. Therefore, any surface soil analytical result above background would skew the prioritization score to a higher result. This is not justified given the information on usage and natural occurrence



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Appendix Q

EXAMPLE OF HISTORICAL RELEASE REPORT UPDATE

APPENDIX Q

1.0 EXAMPLE OF HISTORICAL RELEASE REPORT UPDATE

PAC REFERENCE NUMBER: NW-195

IHSS Reference Number: 195, Operable Unit 16
Unit Name: Nickel Carbonyl Disposal
Approximate Location: N754,500; E2,083,000

Date(s) of Operation or Occurrence

March through August 1972

Description of Operation or Occurrence

From March through August 1972, cylinders of nickel carbonyl were disposed in a dry well located in the buffer zone. The cylinders were opened inside the well and vented with small arms fire to allow decomposition in air (DOE 1994b).

Physical/Chemical Description of Constituents Released

Nickel carbonyl vapors are denser than air. Consequently, the vapors collected and decomposed in the bottom of the well. Because these vapors ignite spontaneously, ignition occurred either immediately after release into the well or sometime after collection at the bottom of the well (DOE 1992a, 1992b).

Response to Operation or Occurrence

After 24 hours of placement in the well, the cylinders were removed from the hole, vented by small arms fire, and buried in the Present Landfill. Two cylinders became stuck in the hole and were buried in place. A minimal amount of nickel carbonyl was probably released to the atmosphere during disposal. Samples (presumably of air) from the lip of the well taken after the initial disposal indicated nickel carbonyl concentrations of approximately 10 parts per million being released during disposal (DOE 1992a, 1992b). This IHSS was then studied in accordance with the IAG as part of OU 16 (DOE 1992b).

Fate of Constituents Released to the Environment

Nickel carbonyl is highly volatile and readily decomposes in the presence of oxygen, forming nickel oxide. Nickel oxide is highly insoluble in groundwater. For every gram (0.002 pound) of

nickel oxide in contact with typical groundwater, approximately 10–26 microgram of nickel per liter is transferred to solution. Wind dispersion subsequently disseminated the nickel oxide particles, which therefore would not be detected at concentrations exceeding background. IHSS 195 does not pose a risk to human health and the environment because there are no viable transport pathways.

Action/No Action Recommendation

Based on information presented in the *Final No Further Action Justification Document for Operable Unit 16, Low-Priority Sites* (DOE 1992b), a CAD/ROD recommending no action under CERCLA for IHSS 195 was prepared, and received final approval on October 28, 1994 (see attached declaration).

Comments

None.



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Appendix R

ADMINISTRATIVE RECORD

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APPENDIX R

1.0 ADMINISTRATIVE RECORD DOCUMENT IDENTIFICATION

In assessing the relevance of a document to the AR, there are two basic questions: 1) could the document be used or relied upon in deciding how to clean up an IHSS, and 2) will the document be used to inform or involve the public in the clean up of IHSSs at Rocky Flats? A document does not need to be specific to an IHSS to be considered for its remediation. An example would be a document outlining procedures for protecting endangered species at Rocky Flats. While this does not address itself to any particular IHSS, all proposals for remediation would have to take the endangered species procedure into consideration.

Below are some specific documents types that would be included in the AR. Documents generally excluded from the AR are listed in the Level 1 procedure, 1-F78-ER-ARP.001, CERCLA *Administrative Record Program* (RMRS, 1994b).

In accordance with 40 CFR § 300.810, the AR for the selection of a response action may contain the following types of documents.

1. Documents containing factual information and data, and analysis of the factual information and data that form a basis for the selection of a response action, such as the following:

- CEARP reports
- RI/FS Work Plan
- Amendments to the Final Work Plan
- SAP (consisting of a QAPjP and a FSP)
- Validated and verified sampling and analysis data
- Chain of Custody forms
- Site inspection and evaluation reports
- Data summary sheets
- Technical and engineering evaluation performed for the site
- IHSS-specific HSPs
- Documents supporting the LRA's determination of imminent and substantial endangerment assessment
- Documentation of applicable of relevant and appropriate requirements
- RI/FS Report

- RFI/RIs
- RFI/RI TMs
- Data submitted by the public (including potentially responsible parties)

2. Documents received, published, or made available to the public for remedial actions or removal plans, such as:

- RFSIPIP
- PP
- Public notices of AR availability and public comment periods
- Documentation of public hearings
- Public comments
- Transcripts of public meetings
- Response to significant comments
- Responses to comments from state or federal agencies

3. Other information, such as:

- AR File Index
- Documentation of State involvement
- Health assessments
- Natural Resource Trustee notices and responses, findings of fact, final reports and natural resource damage assessments
- Decision documents rising from dispute resolutions

4. Decision Documents, such as:

- IM/IRA
- RODs (including responsiveness summary)
- Explanations of significant differences
- Amended RODs and underlying information

5. For CERCLA sites with a history of RCRA activity, any relevant RCRA information that may be considered or relied on in selecting the CERCLA response action.

Appendix A

FRAMEWORK FOR PROJECT SCOPING

APPENDIX A

1.0 PURPOSE

The Framework for Project Scoping is intended to provide a more direct approach to understanding the constraints RFCA imposes on activities conducted at RFETS. RFCA divides activities/processes into five broad categories, and divides RFETS into two areas. The five activities include:

- deactivation
- decommissioning
- environmental remediation
- CAD/RODs
- Site-wide activities

The two areas include:

- buffer zone
- industrial area

The framework that follows represents a matrix of the first four activities/processes (Site-wide activities are excluded) paired with a buffer zone or industrial area location. Site-wide activities are not divided by location as they are, by definition, not location dependent. The result is a matrix composed of nine elements.

By assembling the information within the activity and location-based matrix, users can readily access and understand topics that may otherwise be widely distributed throughout RFCA. The topics included in the framework were chosen based upon commonly encountered questions as to authority and jurisdiction and based upon topics which need to be addressed during project scoping.

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Activity: DEACTIVATION
Location: INDUSTRIAL AREA

Sources of RFCA Authority:
None

Potential Authorities External to RFCA:

Colorado Hazardous Waste Act and Rules

CHWA/RCRA Part B Permit

CHWA/RCRA Interim Status Requirements

Generator and transporter CHWA/RCRA Hazardous Waste Management Requirements

NRC Licensing Requirements for Off-site Disposal Facilities

Atomic Energy Act

DOE Orders

NEPA

NPDES Permit

Colorado Water Quality Control Act and Rules

NESHAP

Colorado Air Pollution Prevention and Control Act and Rules

OSHA

TSCA (PCBs)

Decision-making Responsibility:

For Non-waste (Radioactive Materials, SNM, Transuranic (TRU), Byproducts) during Operations; Processing; On-site Storage, Transport, and Decontamination (not associated with decommissioning); **Deactivation**; and Final Disposition-

DNFSB - Primary; CDPHE - Review and Comment

For Low Level Waste during Operations; Processing; On-site Storage, Transport, and Decontamination (not associated with decommissioning); **Deactivation**; and Final Disposition-

DNFSB - Primary; CDPHE Review and Concur if final disposition in Colorado, with CDPHE Primary on final disposition itself

For TRU Mixed Waste during Operations; Processing; On-site Storage, Transport, and Decontamination (not associated with decommissioning); **Deactivation**; and Final Disposition-

CDPHE - Primary; DNFSB - Review and Concur

Activity: DEACTIVATION (continued)
Location: INDUSTRIAL AREA (continued)

For Low-Level Mixed Waste during Operations; Processing; On-site Storage, Transport, and Decontamination (not associated with decommissioning); **Deactivation**; and Final Disposition-

CDPHE - Primary; DNFSB - Review and Concur

For Hazardous and Solid Waste during Operations; Processing; On-site Storage, Transport, and Decontamination (not associated with decommissioning); **Deactivation**; and Final Disposition-

CDPHE - Primary

For CERCLA Hazardous Substances (exclusively) during Operations; Processing; On-site Storage, Transport, and Decontamination (not associated with decommissioning); **Deactivation**; and Final Disposition-

CDPHE - Primary; EPA retains final authority on Record of Decision

Waste Management:

Wastes removed during deactivation are fully regulated as RCRA hazardous waste; as TSCA waste (PCBs); as solid waste; as low level waste; as TRU waste; or any combination. In addition, municipal waste and radiologically contaminated property must be considered.

Permit Waiver:

Permit waivers for deactivation in the Industrial Area are not available. Full administrative and substantive compliance is required. Elementary neutralization, and 90-day LDR treatment in tanks or containers do not require permits.

RCRA Closure:

Because it is not anticipated that deactivation will be performed pursuant to a RFCA decision document, the closure requirements and procedures in the RCRA Part B permit apply.

Requirements Analysis:

Deactivation must be conducted in full compliance with all administrative and substantive requirements of applicable environmental regulatory authorities. Because it is not anticipated that deactivation will be performed pursuant to a RFCA decision document, the closure requirements and procedures in the RCRA Part B permit apply.

Activity: DEACTIVATION (continued)
Location: INDUSTRIAL AREA (continued)

Modifications:

Modifications to a closure plan submitted pursuant to the Part B Permit or the interim status requirements are subject to the Part B permit or Part 265 requirements and procedures.

Public Involvement:

Deactivation that does not involve closure of RCRA units can be accomplished without public notice and comment.

Exceptions/Comments:

As part of scoping also consider non-RFCA authorities, including NEPA, air, water, and ecological concerns. See the discussions at Section 2.6.

Activity: DEACTIVATION
Location: BUFFER ZONE

Sources of RFCA Authority:

Not applicable.

Potential Authorities External to RFCA:

Not applicable.

Decision making Responsibility:

Not applicable.

Waste Management:

Not applicable.

Permit Waiver:

Not applicable.

RCRA Closure:

Not applicable.

Requirements Analysis:

Not applicable.

Modifications:

Not applicable.

Public Involvement:

Not applicable.

Exceptions/Comments:

Deactivation will not be required in the Buffer Zone.

Activity: DECOMMISSIONING
Location: INDUSTRIAL AREA

Sources of RFCA Authority:

CERCLA/NCP Removal Action Authorities
CHWA/RCRA Permitted and Interim Status Closure Requirements
CHWA/RCRA Corrective Action Requirements

Potential Authorities External to RFCA:

Colorado Hazardous Waste Act and Rules
CHWA/RCRA Part B Permit
CHWA/RCRA Interim Status Requirements
Generator and transporter CHWA/RCRA Hazardous Waste Management Requirements
NRC Licensing Requirements for Off-site Disposal Facilities
Atomic Energy Act
DOE Orders
Colorado Water Quality Control Act and Rules
Colorado Air Pollution Prevention and Control Act and Rules
CHWA/RCRA Permitted and Interim Status Closure Requirements
NPDES Permit and Rules
Stormwater Permitting Requirements
NEPA
Industrial Area IM/IRA
NESHAP
OSHA
TSCA (PCBs)

Decision making Responsibility:

For Non-waste (radioactive materials, SNM, TRU, Byproduct), LLW, TRU-Mixed Waste, Low Level Mixed Waste, during decontamination of residual contamination of fixed structures and during dismantlement and demolition

CDPHE - Primary; EPA - Review and Comment; DNFSB - Review and Comment

For Hazardous and Solid Waste and CERCLA/RCRA Material in the Environment during decontamination of residual contamination of fixed structures and during dismantlement and demolition

CDPHE - Primary; EPA - Review and Comment

Permit Waiver:

Permit waivers are available in the Industrial Area for decommissioning activities (§16). The basis for the permit waiver must be included in the decision document in accordance with RFCA §17.

Activity: DECOMMISSIONING (continued)
Location: INDUSTRIAL AREA (continued)

Waste Management:

By operation of RFCA, decommissioning waste is remediation waste. Equipment contaminated with limited hazardous or solid waste residues that remain after deactivation/removal may be regulated by CDPHE as decommissioning. If CDPHE elects to regulate the final remediation of the contaminated equipment as a decommissioning activity the residual wastes in the equipment shall be considered remediation wastes.

During the decommissioning project permits for waste management are not required (see "permit waiver," above). At the close of the decommissioning project the decommissioning wastes become fully regulated (substantively and procedurally) as either RCRA hazardous waste; as TSCA waste (PCBs); as solid waste; as low level waste; as TRU waste; or any combination. Although fully regulated, if a CAMU becomes operational at some future time, the wastes remain "remediation wastes" and may be managed in the CAMU. Remediation waste may also be managed in CAMU waste piles and temporary units (as ARAR) in either the Industrial Area or the Buffer Zone.

At any time the decommissioning wastes are shipped off-site they are fully regulated (substantively and procedurally) as either RCRA hazardous waste; as TSCA waste (PCBs); as solid waste; as low level waste; as TRU waste; or any combination.

The CERCLA Off-site Rule determinations and updates will be maintained by the RFETS contract representative for each off-site disposal contract.

Water Management:

Remediation wastewater generated during decommissioning can be managed, as appropriate, by free release where surface-water quality ARARs are attained; in the sewage treatment plant in accordance with the NPDES permit requirements; or in the Consolidated Water Treatment Facility (CWTF) in B891 if the remediation wastewater meets the CDPHE Wastewater Treatment Unit Policy. Authority for management in the CWTF must be provided in the decision document.

RCRA Closure:

During decommissioning, the complete or phased closure of permitted units, of interim status units and of IHSSs designated as "RCRA" in RFCA Appendix 3, may, at CDPHE discretion, use either a separate closure plan or an accelerated action decision document. If an accelerated action decision document is used the closure requirements must be addressed in that document. There are three types of accelerated action decision documents that may act in lieu of a permit modification: 1) IM/IRAs, 2) PAMs, 3) RSOPs. The substantive and administrative requirements for complete or phased closure of permitted units are found in the Part B permit and the requirements for closure of interim status units are found in Attachment 10 of RFCA.

Activity: DECOMMISSIONING (continued)
Location: INDUSTRIAL AREA (continued)

Requirements Analysis:

A requirements analysis must be performed. Pursuant to the NCP, removal actions require attainment of ARARs to the maximum extent practicable. If an accelerated action decision document is used in lieu of a permit modification, the applicable closure requirements, including post-closure care must be addressed by the decision document.

The requirements associated with authorities external to RFCA must also be addressed. Waste management, wastewater management, stormwater management, air permitting, NEPA and ecological concerns must be considered.

Modifications:

Field modifications, minor modifications and major modifications are allowed. See Section 3.10 for a discussion.

Public Involvement:

PAMs require a thirty-day public comment period. IM/IRAs and RSOPs require a forty five to sixty-day public comment period, except for Class 3 permit modifications. Any IM/IRA that requires a Class 3 permit modification will be subject to two sixty-day comment periods. Once public comment on the RSOP is complete, the RSOP may be invoked by letter notification to the parties. For a complete description see Section 5.0 and the sample schedules provided for each type of decision document in the Appendices.

Exceptions/Comments:

The Industrial Area IM/IRA imposes groundwater, surface water and air monitoring obligations on decommissioning activities conducted in the Industrial Area. As such, the Industrial Area IM/IRA obligations must be considered and addressed during project scoping. Implementation of the Industrial Area IM/IRA obligations must conform to the building decommissioning decision process presented in the IMP.

As part of scoping also consider non-RFCA authorities, including NEPA, air, water, and ecological concerns. See the discussions at Section 2.6.

Soil data generated as part of the decommissioning must be formally transferred and incorporated in the SWD. In addition, existing data that are "No Longer Representative" must be flagged in the database.

Activity: DECOMMISSIONING
Location: BUFFER ZONE

Sources of RFCA Authority:

CERCLA/NCP Removal Action Authorities
CHWA/RCRA Interim Status Closure Requirements
CHWA/RCRA Corrective Action Requirements

Potential Authorities External to RFCA:

Colorado Hazardous Waste Act and Rules
CHWA/RCRA Part B Permit
CHWA/RCRA Interim Status Requirements
Generator and transporter CHWA/RCRA Hazardous Waste Management Requirements
NRC Licensing Requirements for Off-site Disposal Facilities
Atomic Energy Act
DOE Orders
Colorado Air Pollution Prevention and Control Act and Rules
Colorado Water Quality Control Act and Rules
NPDES Permit
Stormwater Permitting Requirements
NEPA
NESHAP
OSHA
TSCA (PCBs)

Decision making Responsibility:

For decommissioning performed in the buffer zone-

EPA - Primary; CDPHE - Review and Comment

Waste Management:

By operation of RFCA, decommissioning waste is remediation waste.

During the decommissioning project, permits for waste management (i.e., storage > 90 days) are not required (see "permit waiver," below), but the waste management must comply with the substantive requirements of RCRA. At the close of the decommissioning project, the decommissioning wastes become fully regulated (substantively and procedurally) as either RCRA hazardous waste, as solid waste, as low level waste, as TRU waste, or any combination if the wastes are moved into the industrial area. Although fully regulated in the industrial area, if a CAMU becomes operational at some future time, the wastes remain "remediation wastes" and may be managed in the CAMU. Remediation waste may also be managed in CAMU waste piles and temporary units (as ARAR) in either the Industrial Area or the Buffer Zone.

Activity: DECOMMISSIONING (continued)
Location: BUFFER ZONE (continued)

At any time the decommissioning wastes are shipped off-site they are fully regulated (substantively and procedurally) as either RCRA hazardous waste, as TSCA waste (PCBs), as solid waste, as low level waste, as TRU waste, or any combination.

Water Management:

Remediation wastewater generated during decommissioning can be managed, as appropriate, by free release where surface-water quality ARARs are attained; in the sewage treatment plant in accordance with the NPDES permit requirements; or in the CWTF in B891 if the remediation wastewater meets the CDPHE Wastewater Treatment Unit Policy. Authority for management in the CWTF must be provided in the decision document.

The CERCLA Off-site Rule determinations and updates will be maintained by the RFETS contract representative for each off-site disposal contract.

Permit Waiver:

Permit waivers are available in the buffer zone. The basis for the permit waiver must be included in the decision document in accordance with RFCA ¶17.

RCRA Closure:

During decommissioning, the complete or phased closure of interim status units and of IHSSs designated as "RCRA" in RFCA Appendix 3, may, at CDPHE discretion, use a separate closure plan or an accelerated action decision document. There are three types of accelerated action decision documents that may act in lieu of a permit modification: 1) IM/IRAs, 2) PAMs, 3) RSOPs. The substantive and administrative requirements for closure of permitted units are found in the Part B permit; and the requirements for closure of interim status units are found in Attachment 10 of RFCA.

Requirements Analysis:

A requirements analysis must be performed. Pursuant to the NCP, removal actions must attain ARARs to the extent practicable considering the exigencies of the circumstance. If an accelerated action decision document is used in lieu of a permit modification the applicable closure requirements, including post-closure care must be addressed by the decision document.

Modifications:

Field modifications, minor modifications and major modifications are allowed. See Section 3.10 for a complete discussion.

Activity: DECOMMISSIONING (continued)
Location: BUFFER ZONE (continued)

Public Involvement:

PAMs require a thirty-day public comment period. IM/IRAs and RSOPs require a forty five to sixty-day public comment period except for Class 3 permit modifications. Any IM/IRA that requires a Class 3 permit modification will be subject to dual sixty-day comment periods. Once public comment on the RSOP is complete, the RSOP may be invoked by letter notification to the parties. For a complete description see Section 5.0 and the sample schedules provided for each type of decision document in the Appendices.

Exceptions/Comments:

As part of scoping also consider non-RFCA authorities, including NEPA, air, water, Fish and Wildlife and wetlands issues. See the discussions at Section 2.6. Performance monitoring is required for all groundwater remedies and should be noted in the decision document. Details of the monitoring will be developed and implemented through the IMP. Similarly, performance monitoring will be required for some soil remedies, and if appropriate should be identified in the decision document. (See Section 3.4.E of the ALF).

Soil data generated as part of the decommissioning must be formally transferred and incorporated in the SWD. In addition, existing data that are "No Longer Representative" must be flagged in the database.

Activity: ACCELERATED ACTIONS
Location: INDUSTRIAL AREA

Sources of RFCA Authority:

CERCLA/RCRA Corrective Action
NCP Removal Action Authorities
EE/CA Guidance
Proposed RCRA Corrective Action Rule (as guidance)
RCRA Corrective Action Guidance (March 1996)
CHWA/RCRA Interim Status Closure Requirements (RFCA Attachment 10)

Potential Authorities External to RFCA:

Colorado Hazardous Waste Act and Rules
CHWA/RCRA Part B Permit
CHWA/RCRA Interim Status Requirements
Generator and transporter CHWA/RCRA Hazardous Waste Management Requirements
NRC Licensing Requirements for Off-site Disposal Facilities
Atomic Energy Act
DOE Orders
Colorado Air Pollution Prevention and Control Act and Rules
Colorado Water Quality Control Act and Rules
NPDES Permit
Stormwater Permitting Requirements
NEPA
NESHAP
OSHA
TSCA

Decision making Responsibility:

For accelerated action performed in the industrial area-

CDPHE - Primary; EPA - Review and Comment

Waste Management:

Wastes generated pursuant to a RFCA accelerated action are remediation wastes. In the industrial area, accelerated action remediation wastes are fully regulated (substantively and procedurally) as either RCRA hazardous waste; as TSCA (PCBs); as solid waste; as low level waste; as TRU waste; or any combination. Although fully regulated, if a CAMU becomes operational at some future time, the wastes remain "remediation wastes" and may be managed in the CAMU. Accelerated Action remediation wastes may also be handled in CAMU waste piles and temporary units in the industrial area, but these units would required full permitting.

Activity: ACCELERATED ACTIONS (continued)
Location: INDUSTRIAL AREA (continued)

At any time the accelerated action remediation wastes are shipped off-site they are fully regulated (substantively and procedurally) as either RCRA hazardous waste; as TSCA waste (PCBs); as solid waste; as low level waste; as TRU waste; or any combination.

The CERCLA Off-site Rule determinations and updates will be maintained by the RFETS contract representative for each off-site disposal contract.

Water Management:

Remediation wastewater generated during accelerated actions can be managed, as appropriate, by free release where surface-water quality ARARs are attained; in the sewage treatment plant in accordance with the NPDES permit requirements; or in the CWTF in B891 if the remediation wastewater meets the CDPHE Wastewater Treatment Unit Policy. Authority for management in the CWTF must be provided in the decision document.

Permit Waiver:

Permit waivers for accelerated actions are limited in the industrial area to actions involving materials that are not also hazardous wastes or hazardous constituents (ie. radionuclides that are not mixed wastes, PCB, constituents that are CERCLA hazardous substances not identified in RCRA).

RCRA Closure:

During accelerated action, the complete or phased closure of permitted units, of interim status units and of IHSSs designated as "RCRA" in RFCA Appendix 3, may, at CDPHE discretion, use a separate closure plan or the accelerated action decision document. There are three types of accelerated action decision documents that may act in lieu of a permit modification: 1) IM/IRAs, 2) PAMs, 3) RSOPs. The substantive and administrative requirements for closure of permitted units are found in the Part B permit; and the requirements for closure of interim status units are found in Attachment 10 of RFCA.

Requirements Analysis:

A requirements analysis must be performed. Pursuant to the NCP, removal actions must attain ARARs to the extent practicable considering the exigencies of the circumstance. If an accelerated action decision document is used in lieu of a permit modification the applicable closure requirements, including post-closure care must be addressed by the decision document.

Modifications:

Field modifications, minor modifications and major modifications are allowed. See Section 3.10 for a complete discussion.

Activity: ACCELERATED ACTIONS (continued)
Location: INDUSTRIAL AREA (continued)

Public Involvement:

PAMs require a thirty-day public comment period. IM/IRAs and RSOPs require a forty-five to sixty-day public comment period, except for Class 3 permit modifications. Any IM/IRA that requires a Class 3 permit modification will be subject to dual sixty-day comment periods. Once public comment on the RSOP is complete, the RSOP may be invoked by letter notification to the parties. For a complete description see Section 5.0 and the sample schedules provided for each type of decision document in the Appendices.

Exceptions/Comments:

As part of scoping also consider non-RFCA authorities, including NEPA, air, water, and ecological concerns. See the discussions at Section 2.6.

Note that the RFCA Action Level Framework requires that groundwater performance monitoring be conducted in conjunction with remedial activities. (See ALF, Section 3.4E.). Similarly, the Industrial Area IM/IRA imposes groundwater, surface-water and air monitoring obligations on "non-routine activities" conducted in the Industrial Area that may effect groundwater, surface water or air. As such, the Industrial Area IM/IRA obligations must be considered and addressed during project scoping. Implementaion of the performace monitoring will be accomplished in accordance with the IMP.

Soil data generated as part of the accelerated action must be formally transferred and incorporated in the SWD. In addition, existing data that are "No Longer Representative" must be flagged in the database.

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Activity: ACCELERATED ACTIONS
Location: BUFFER ZONE

Sources of RFCA Authority:

CERCLA/RCRA Corrective Action

NCP Removal Action Authorities

EE/CA Guidance

Proposed RCRA Corrective Action Rule (as guidance)

RCRA Corrective Action Guidance (March 1996)

CHWA/RCRA Interim Status Closure Requirements (RFCA Attachment 10)

Potential Authorities External to RFCA:

Colorado Hazardous Waste Act and Rules

CHWA/RCRA Part B Permit

CHWA/RCRA Interim Status Requirements

Generator and transporter CHWA/RCRA Hazardous Waste Management Requirements

NRC Licensing Requirements for Off-site Disposal Facilities

Atomic Energy Act

DOE Orders

Colorado Air Pollution Prevention and Control Act and Rules

Colorado Water Pollution Control Act and Rules

NPDES Permit

Stormwater Permitting Requirements

NEPA

NESHAP

OSHA

TSCA (PCBs)

Decision making Responsibility:

For accelerated action performed in the buffer zone-

EPA - Lead/Primary; CDPHE - Support, Review and Comment

Waste Management:

Wastes generated in pursuant to a RFCA accelerated action are remediation wastes. In the buffer zone permits for waste management are not required (see "permit waiver," below), but the waste management must comply with the substantive requirements of RCRA. If the accelerated action remediation wastes are moved into the industrial area for storage or treatment the wastes become fully regulated (substantively and procedurally) as either RCRA hazardous waste; as TSCA waste (PCBs); as solid waste; as low level waste; as TRU waste; or any combination, if the wastes are moved into the industrial area.

Activity: ACCELERATED ACTIONS (continued)
Location: BUFFER ZONE (continued)

Although fully regulated in the industrial area, if a CAMU becomes operational at some future time, the wastes remain "remediation wastes" and may be managed in the CAMU. Remediation waste may also be managed in CAMU waste piles and temporary units (as ARAR) in the buffer zone but these units would require full permitting to handle accelerated action remediation wastes in the industrial area.

At any time the accelerated action remediation wastes are shipped off-site they are fully regulated (substantively and procedurally) as either RCRA hazardous waste; as TSCA waste (PCBs); as solid waste; as low level waste; as TRU waste; or any combination

The CERCLA Off-site Rule determinations and updates will be maintained by the RFETS contract representative for each off-site disposal contract.

Water Management:

Remediation wastewater generated during accelerated actions can be managed, as appropriate, by free release where surface-water quality ARARs are attained; in the sewage treatment plant in accordance with NPDES permit requirements; or in the CWTF in B891 if the remediation wastewater meets the CDPHE Wastewater Treatment Unit Policy. Authority for management in the CWTF must be provided in the decision document.

Permit Waiver:

Permit waivers are available in the buffer zone. The basis for the permit waiver must be included in the decision document in accordance with RFCA ¶17.

RCRA Closure:

During accelerated action, the complete or phased closure of permitted units, of interim status units and of IHSSs designated as "RCRA" in RFCA Appendix 3, may, at CDPHE discretion, use a separate closure plan or an accelerated action decision document. There are three types of accelerated action decision documents that may act in lieu of a permit modification: 1) IM/IRAs, 2) PAMs, 3) RSOPs. The substantive and administrative requirements for closure of permitted units are found in the Part B permit; and the requirements for closure of interim status units are found in Attachment 10 of RFCA.

Requirements Analysis:

A requirements analysis must be performed. Pursuant to the NCP, removal actions must attain ARARs to the extent practicable considering the exigencies of the circumstance. If an accelerated action decision document is used in lieu of a permit modification the applicable closure requirements, including post-closure care must be addressed by the decision document.

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Activity: ACCELERATED ACTIONS (continued)
Location: BUFFER ZONE (continued)

Modifications:

Field modifications, minor modifications and major modifications are allowed. See Section 3.10 for a complete discussion.

Public Involvement:

PAMs require a thirty-day public comment period. IM/IRAs and RSOPs require a forty five to sixty-day public comment period except for Class 3 permit modifications. Any IM/IRA that requires a Class 3 permit modification will be subject to dual sixty-day comment periods. Once public comment on the RSOP is complete, the RSOP may be invoked by letter notification to the parties. For a complete description see Section 5.0 and the sample schedules provided for each type of decision document in the Appendices.

Exceptions/Comments:

As part of scoping also consider non-RFCA authorities, including waste management, NEPA, air, water, and ecological concerns. See the discussions at Sections 2.6. Note that the RFCA Action Level Framework requires that groundwater performance monitoring be conducted in conjunction with groundwater remedial activities and in conjunction with some activities involving soil remediation. (See ALF, Section 3.4E.). Implementation of the performance monitoring will be accomplished in accordance with the IMP.

Soil data generated as part of the accelerated action must be formally transferred and incorporated in the SWD. In addition, existing data that are "No Longer Representative" must be flagged in the database.

Activity: CAD/ROD
Location: INDUSTRIAL AREA OU

Sources of Authority:

CERCLA

NCP Remedial Action Authority

CHWA/RCRA Corrective Action Authority

Proposed RCRA Corrective Action Rule (as guidance)

RCRA Corrective Action Guidance (March 1996)

Potential Authorities External to RFCA:

Colorado Hazardous Waste Act and Rules

CHWA/RCRA Part B Permit

CHWA/RCRA Interim Status Requirements

Generator and transporter CHWA/RCRA Hazardous Waste Management Requirements

NRC Licensing Requirements for Off-site Disposal Facilities

Atomic Energy Act

DOE Orders

Colorado Air Pollution Prevention and Control Act and Rules

Colorado Water Pollution Control Act and Rules

NPDES Permit

Stormwater Permitting Requirements

NEPA

NESHAP

OSHA

TSCA (PCBs)

Decision making Responsibility:

For hazardous constituents-

CDPHE lead for hazardous constituents pursuant to CHWA/RCRA

For radionuclides and hazardous substances-

DOE is CERCLA lead with CDPHE providing review, and if appropriate, concurrence recommendation to EPA for radionuclides and hazardous substances, with EPA then concurring with the DOE remedial decision if it is consistent with CERCLA.

Waste Management:

Wastes generated during remedial actions conducted pursuant to the CAD/ROD are remediation wastes. Permits for CAD/ROD waste management are not required (see "permit waiver," below), but the waste management must comply with the substantive requirements of RCRA.

Activity: CAD/ROD (continued)
Location: INDUSTRIAL AREA OU (continued)

The CERCLA Off-site Rule determinations and updates will be maintained by the RFETS contract representative for each off-site disposal contract.

At any time the CAD/ROD remediation wastes are shipped off-site they are fully regulated (substantively and procedurally) as either RCRA hazardous waste; as TSCA waste (PCBs); as solid waste; as low level waste; as TRU waste; or any combination.

Water Management:

Remediation wastewater generated during final actions under a CAD/ROD can be managed, as appropriate, by free release where surface-water quality ARARs are attained; in the sewage treatment plant in accordance with the NPDES permit requirements; or in the CWTF in B891 if the remediation wastewater meets the CDPHE Wastewater Treatment Unit Policy. Authority for management in the CWTF must be provided in the decision document.

Permit Waiver:

Available for Concurrence CAD/ROD. The basis for the permit waiver must be included in the decision document in accordance with RFCA ¶17.

RCRA Closure:

If RCRA closures are completed during the CAD/ROD a separate permit modification must be prepared, submitted and approved.

Requirements Analysis:

A requirements analysis must be performed. Pursuant to the NCP, remedial actions must attain ARARs or invoke one of the CERCLA waivers.

Modifications:

Field modifications, minor modifications and major modifications are allowed. See Section 3.10 for a complete discussion.

Public Involvement:

Public comment must be provided in accordance with the NCP.

Exceptions/Comments:

As part of scoping also consider non-RFCA authorities, including NEPA, air, water, and ecological concerns. See the discussions at Section 2.6. Note that the RFCA Action Level Framework requires that groundwater performance monitoring be conducted in conjunction with remedial activities. (See ALF, Section 3.4E.).

The need to incorporate soil data generated as part of the final action under a CAD/ROD into the SWD should be determined during project scoping.

Activity: CAD/ROD
Location: BUFFER ZONE and Off-site OU

Sources of Authority:

CERCLA

NCP Remedial Action Authority

CHWA RCRA Corrective Action Authority

Proposed RCRA Corrective Action Rule

RCRA Corrective Action Guidance (March 1996)

Potential Authorities External to RFCA:

Colorado Hazardous Waste Act and Rules

CHWA/RCRA Part B Permit

CHWA/RCRA Interim Status Requirements

Generator and transporter CHWA/RCRA Hazardous Waste Management Requirements

NRC Licensing Requirements for Off-site Disposal Facilities

Atomic Energy Act

DOE Orders

Colorado Air Pollution Prevention and Control Act and Rules

NPDES Permit

Stormwater Permitting Requirements

NEPA

NESHAP

OSHA

TSCA (PCBs)

Decision making Responsibility:

For CAD/RODs in the Buffer Zone and Off-site-

EPA lead; CDPHE review and if concurrence, a "concurrence CAD/ROD" will be issued

Waste Management:

Wastes generated during remedial actions conducted pursuant to the CAD/ROD are remediation wastes. Permits for CAD/ROD waste management are not required (see "permit waiver," below), but the waste management must comply with the substantive requirements of RCRA.

At any time the CAD/ROD remediation wastes are shipped off-site they are fully regulated (substantively and procedurally) as either RCRA hazardous waste; as TSCA waste (PCBs); as solid waste; as low level waste; as TRU waste; or any combination.

The CERCLA Off-site Rule determination and updates will be maintained by the RFETS contract representative for each off-site disposal contract.

Activity: CAD/ROD (continued)
Location: BUFFER ZONE and Off-site OU (continued)

Water Management:

Remediation wastewater generated during final actions under a CAD/ROD can be managed, as appropriate, by free release where surface-water quality ARARs are attained; in the sewage treatment plant in accordance with the NPDES permit requirements; or in the CWTF in B891 if the remediation wastewater meets the CDPHE Wastewater Treatment Unit Policy. Authority for management in the CWTF must be provided in the decision document.

Permit Waiver:

Available for Concurrence CAD/ROD. The basis for the permit waiver must be included in the decision document in accordance with RFCA ¶17.

RCRA Closure:

If RCRA closures are completed during the CAD/ROD a separate permit modification must be prepared, submitted and approved.

Requirements Analysis:

A requirements analysis must be performed. Pursuant to the NCP, remedial actions must attain ARARs or invoke one of the CERCLA waivers.

Modifications:

Field modifications, minor modifications and major modifications are allowed. See Section 3.10 for a complete discussion. Note that major modifications require additional public notice and opportunity for public comment.

Public Involvement:

Public comment must be provided in accordance with the NCP.

Exceptions/Comments:

As part of scoping also consider non-RFCA authorities, including NEPA, air, water, and ecological concerns. See the discussions at Sections 2.6.

The need to incorporate soil data generated as part of the final action under a CAD/ROD into the SWD should be determined during project scoping.

Activity: SITE-WIDE TREATMENT
Location: SITE-WIDE

Sources of Authority:
(reserved)

Potential Authorities External to RFCA:
(reserved)

Decision making Responsibility:
Joint.

Waste Management:
(reserved)

Permit Waiver:
(reserved)

RCRA Closure:
(reserved)

Requirements Analysis:
(reserved)

Modifications:
(reserved)

Public Involvement:
(reserved)

Exceptions/Comments:
(reserved)

Appendix B

RFETS ENVIRONMENTAL CHECKLIST

Kaiser-Hill Environmental Compliance and Operations Group

ENVIRONMENTAL CHECKLIST

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

1. Project Name:
2. Date Submitted:
3. NEPA Tracking No.:
4. Charge Number:
5. WAD Number:
6. Project Manager (company, bldg., ext.):
7. Kaiser-Hill Manager (bldg., ext.):
8. Prepared By (company, bldg., ext.):
9. Project Description (be as detailed and specific as possible, use the checklist as a guide for issues to be addressed in the description of the project, submit to K-H NEPA for review):

Reviewed for Classification/UCNI

By: _____

Date: _____

	<u>YES</u>	<u>NO</u>	<u>NOTES</u>
10. Will the project require a new or modified permit under the:			
A. Clean Air Act? (e.g., APENs, Rad-NESHAP, fugitive dust, etc.)	_____	_____	
B. Clean Water Act? (e.g., discharges, chemicals, etc.)	_____	_____	
11. Resource Conservation and Recovery Act (RCRA):			
A. Will the project generate, treat, store, or dispose of hazardous, radioactive, or mixed waste?	_____	_____	
B. Will the project involve a removal?	_____	_____	
C. Will the project include RCRA closure?	_____	_____	
-partial?	_____	_____	
-full?	_____	_____	
D. Will the project include excavation or capping to meet RCRA requirements?	_____	_____	
E. Will cost and duration stay within \$5 million and 60 months? (Explain in Section 9, Project Description)	_____	_____	
F. Will a RCRA permit or permit modification be required?	_____	_____	
12. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)			
A. Is the project part of an activity required in the Rocky Flats Cleanup Agreement?	_____	_____	
B. If the answer to A. is YES, is the project described in a document that has been approved by EPA or CDPHE, or will be approved by at least one of those agencies before project work begins?	_____	_____	
C. If the answers to both A. and B. are YES, has that document been reviewed by the K-H NEPA group for inclusion of NEPA values?	_____	_____	
13. Monitoring			
A. Will the project require performance monitoring per RFCA or IA IM/IRA requirements?	_____	_____	
B. If the answer to A is YES, have appropriate steps been taken to implement those requirements through the Integrated Monitoring Plan?	_____	_____	

	<u>YES</u>	<u>NO</u>	NOTES
14. Toxic Substances Control Act			
A. Will the project require an Asbestos Abatement permit?	_____	_____	
B. Will the project generate PCB-containing waste?	_____	_____	
C. Will the project result in any potential PCB-containing material that would be available for commercial resale, reuse, or recycle?	_____	_____	
15. Have all steps been taken to ensure compliance with procedures 1-G98-EPR-END.04, Migratory Bird Evaluation and Protection, and 1-D06-EPR- END.03, Identification and Protection of Threatened, Endangered, and Special-Concern Species?	_____	_____	
16. Will the project be in or near an Individual Hazardous Substance Site (IHSS)? (If YES, discuss in Section 9, Project Description)	_____	_____	
17. Will the project construct or require a new or expanded waste disposal, recovery, storage, or treatment facility?	_____	_____	
18. Is the project part of an agreement between DOE and another federal or state agency? (Specify and explain any schedule urgency and deadlines in Section 9, Project Description.)	_____	_____	
19. Is the project:			
A. A new process, building, etc.?	_____	_____	
B. A modification to an existing process, building, etc.?	_____	_____	
C. An installation of capital equipment?	_____	_____	
20. Will the project be located in or adversely affect:			
A. Wetlands? (i.e., dredge or fill operations)	_____	_____	
B. Designated natural areas?	_____	_____	
C. Prime agricultural land?	_____	_____	
D. Special water sources?	_____	_____	
E. Historical, archaeological, or architectural sites or buildings? (NHPA, HUD)	_____	_____	
F. Impact surface water or groundwater			
G. Effect Preble's Mouse habitat (DOE contact USFWS)	_____	_____	

	<u>YES</u>	<u>NO</u>	NOTES
21. Will the project result in, or have the potential to result in, long term changes to the environment?	_____	_____	
22. Will the project result in changes or disturbances of the following existing conditions:			
A. Noise levels?	_____	_____	
B. Solid wastes?	_____	_____	
C. Radioactive wastes? (including disturbed or excavated contaminated soil)	_____	_____	
D. Hazardous waste?	_____	_____	
23. Will the project have effects on the environment which are likely to be publicly controversial?	_____	_____	
24. Will the project establish a precedent for future projects that will have significant effects, or represent a "decision in principle" about a future consideration?	_____	_____	
25. Is the project related to other projects or to a larger program?	_____	_____	
25. Have pollution prevention measures been considered? (Discuss in Section 9, Project Description.)	_____	_____	
26. Does/Will the project present a radiation health and safety concern during construction or operation? (Price-Anderson Act)	_____	_____	

NOTES:

Approved by Company's (RMRS, SSOC, K-H, WSI, or DCI) Environmental Manager:

Signature

Date

2/23/98

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Appendix C

**PREPARATION OF AN ER
INTERIM MEASURE/INTERIM REMEDIAL ACTION
DOCUMENT**

APPENDIX C

1.0 PREPARATION OF AN ER INTERIM MEASURE/INTERIM REMEDIAL ACTION DOCUMENT

RFCA ¶107 describes the IM/IRA process. That paragraph states:

The draft IM/IRA shall contain a brief summary of data for the site, a description of the proposed action, an explanation of how waste management considerations will be addressed, an explanation of how the proposed action relates to any long-term remedial action objectives, proposed performance standards, all ARARs and action levels related to the proposed action; and an implementation schedule and completion date for the proposed action.

1.1 IM/IRA Format and Content

IM/IRAs are utilized for accelerated actions that will require more than six months for project execution and/or where the remedy is not straightforward and multiple alternatives have been evaluated. Alternative evaluation and selection are not necessary if a presumptive remedy has been selected. The suggested format for an IM/IRA is outlined below. In general, for actions where a formal alternatives analysis is performed, the IM/IRA will follow the format of EPA Guidance on *Conducting Non-time Critical Removal Actions Under CERCLA*, (August 1993.) The EE/CA process is one method of performing a streamlined alternatives development and screening, and should be the upper bound of complexity for the IM/IRA Document. The intent of this guidance is to allow the complexity of the decision document to be based on the complexity of the project.

If an alternatives analysis is performed, the first part of the IM/IRA should describe the project to be performed using the selected remedy. The second part of the IM/IRA should describe the remedy selection process, and explain which remedy was selected and why.

The sections of an IM/IRA should include:

- Executive Summary (Optional)
- Purpose
- Project Description
- Project Approach
- Environmental Impacts
- Compliance with ARARs
- Implementation Schedule

The following sections are necessary if an alternatives analysis is performed:

- Initial Selection and Screening of Alternatives
- Analysis of Alternatives

- Comparative Analysis of Alternatives and Remedy Selection
- Responsiveness Summary

The selected remedy will be described in the first part of the IM/IRA. The Responsiveness Summary will be included in either case.

1.2 EXECUTIVE SUMMARY

The Executive Summary provides a general overview of the contents of the IM/IRA and is recommended only for complex problems where special issues are involved and/or where a formal alternative evaluation is performed. The summary should include a brief description of the IHSS or site, the nature of the contamination and related risks (or exceedence of action levels) and scope and objectives of the proposed removal action/interim measure. If a presumptive remedy has been selected, a short statement of why the presumptive remedy is appropriate should be included. If an alternatives analysis was performed, a brief discussion of the alternatives considered and basis for selection of the preferred alternative should be provided. Depending on the length and complexity of the IM/IRA, the Executive Summary is optional.

1.3 INTRODUCTION

The introduction should briefly state:

- The nature of the contamination
- The proposed action
- The intent or goal of the proposed action

The introduction should state whether a presumptive remedy was selected, and why the remedy is appropriate (e.g., a similar remedy has been used in the past for similar contamination or type of problem). If an alternative analysis was performed, the introduction should state why a presumptive remedy was not selected (e.g., the setting or combination of contaminants, special hazards or other project-specific issues).

1.4 SITE DESCRIPTION

The site description will provide IHSS/site information including the contamination history, geological and hydrogeological conditions, remedial investigation data, and a brief summary of risks posed by the contamination and how the action mitigates those risks. If the action is based on exceedence of the RFCA Action Levels, discuss how the action addresses these exceedences. This section will also include a brief description of how the proposed action is consistent with any long-term remedial objectives. If appropriate, the following Background,

General Conditions, and Data Summary subsections can be combined into one section: Existing Conditions and Conceptual Model.

1.4.1 Background

The background section will describe the nature and history of the contamination source. This may include historical information on spills or other releases, any waste operations associated with the contamination, and the relationship between the contamination and other IHSSs.

1.4.2 General Conditions

This summary describes the site-specific conditions or pertinent data to support the rationale for undertaking the action, such as the geological and hydrogeological conditions of the area to be remediated.

Only information relevant to the proposed action should be discussed. General discussions of the site geology, geographic setting, and other general physical characteristics should be referenced to existing documents, such as the sitewide geochemistry and hydrogeology reports.

1.4.3 Data Summary

This section summarizes past remedial investigations or any other available relevant data.

This would include, if relevant:

- Appropriate field investigations such as HPGe surveys, soil gas surveys, etc.
- Groundwater, surface water, soil and/or other relevant analytical results
- Field observations
- Waste disposal data and history
- Any other appropriate, available historical data

The information from the above sections may be presented in a plan view (map), a cross-section (if appropriate), tabular form, or narrative. Locations of relevant sampling points should be shown in relation to the site or area to be remediated. It is helpful to integrate the available data into a conceptual model showing the relationship of the contamination to groundwater, buildings and other structures, surface water, slopes, underground utilities, and other physical items that may impact the project execution.

1.5 PROJECT APPROACH

Proposed Action Objectives narrative remedial and numerical goals are described here. This should be a brief and concise statement of the intended objectives of the action. Remedial

action objectives will include meeting specified cleanup targets for the media being remediated.

If an alternatives analysis was performed, briefly state here specifically what the selected remedy is, and the basis for selection. Refer to the following sections for details on how this remedy will be implemented. If no alternatives analysis was performed, address the reason that the No Action Alternative was not selected (i.e., the site poses a risk, contaminants are above specified action levels, etc.).

1.5.1 Proposed Action

This section details the proposed action including the scope of the action, the proposed remediation methodology, cleanup levels, and site restoration. Where applicable, these details would include information on:

- The scope or extent of the action, including projected volumes of any environmental media to be removed and/or treated
- Excavation methods
- Material handling
- Groundwater or surface water containment and/or recovery methods
- Treatment methods for water, soils, sediments, debris, or other materials generated, including tabulated performance standards for treatment
- Transportation or staging requirements
- Any control measures to minimize the environmental impact of the proposed action (i.e., dust suppression, containment measures, surface water protection)
- Performance monitoring in accordance with the IMP
- Site restoration including any revegetation, backfilling, or regrading

Sampling and analysis requirements will be deferred to the project-specific SAP developed in accordance with the guidelines in Section 3.2 of the IGD.

1.5.2 Worker Health and Safety

This section will include a brief description of the basis for the health and safety requirements, the hazards, monitoring requirements, personal protective equipment (PPE), and actions to protect human health. Action-specific HASP and Hazards Analysis (HA) will be prepared separately.

1.5.3 Waste Management

This section will describe the storage requirements and final disposition of all waste streams that will be generated. Remediation wastes are defined in RFCA ¶25bf as:

Remediation waste means all:

- (1) *Solid hazardous, and mixed wastes;*
- (2) *All media and debris that contain hazardous substances, listed hazardous or mixed wastes that exhibit a hazardous characteristic; and*
- (3) *All hazardous substances generated from activities regulated under this Agreement as RCRA corrective actions or CERCLA response actions, including decommissioning.*

Remediation waste does not include wastes generated from other activities. Nothing in this definition confers RCRA or CHWA authority over source, special nuclear, or byproduct material as those terms are defined in the Atomic Energy Act.

1.6 NEPA

This section is included to identify how NEPA values are incorporated into the decision document. Ideally the NEPA values will be woven throughout the decision document so that they are considered at all phases of the decision making. This section provides an opportunity to reiterate how NEPA values may have been considered in other parts of the decision document, and to touch upon other NEPA values that may not have been directly addressed. The NEPA values to be considered include:

- Air quality during construction and operation of the project
- Water quality (including both surface water, wetlands, and groundwater and the flow characteristics of each)
- Flora and fauna (including threatened and endangered species)
- Historic and cultural resources
- Human health
- Consideration of alternatives including no action
- Irreversible and irretrievable commitment of resources
- Short-term versus long-term use of the proposed site
- Indirect effects
- Cumulative effects (effects from the current project added to the effects from other known projects affecting the same site)

1.7 COMPLIANCE WITH ARARS

This section consists of an analysis of Federal and State ARARs. Chemical-specific, location specific, and action-specific ARARs are identified and tabulated. Section 3.5 of the IGD discusses development and selection of ARARs.

1.8 IMPLEMENTATION SCHEDULE

This section will include a general schedule of when the project is to be implemented, including commencement of field activities and report generation. The format of the schedule will be project-specific. Milestones will be presented at a summary level with nonspecific dates, e.g., "field activities will commence in the second quarter of 1999."

2.0 INITIAL SELECTION AND SCREENING OF ALTERNATIVES

Only a limited number of alternatives (two to four) need to be considered for the IM/IRA. Only the most qualified technologies and/or alternatives that apply to the chemicals of concern (COCs) and affected media need be considered. To the extent possible, presumptive remedies or previous actions for similar situations should be used as a basis for decisions. In these cases, the decision document should reference previous decision documents whenever possible, with the intent of minimizing decision processes.

Each of the alternatives should be discussed in sufficient detail so that the entire process can be understood. For example, treatment and/or disposal of residuals resulting from the remedy should be addressed.

The selected alternatives are evaluated for effectiveness, implementability, and cost. This evaluation is based on the scope of the IM/IRA and each of its specific objectives. The evaluation encompasses the criteria addressed in a full scale CMS/FS, but is done in a much more streamlined manner. The following discussion provides more detailed descriptions of each criterion. The EPA *Guidance on Conducting Non-Time Critical Removal Actions under CERCLA* (EPA, 1993) should be consulted for a description of the alternative screening and evaluation process.

2.1 EFFECTIVENESS

This criteria considers whether or not the alternative provides protection of public health and the environment. Long-term effectiveness, short-term effectiveness, and compliance with ARARs are evaluated for overall protection of public health and the environment.

Short-term effectiveness relates to the protection provided during implementation and before the IM/IRA objectives have been met. It addresses such items as impacts due to fugitive dusts, transportation of hazardous materials, and toxic fumes produced during implementation.

Impacts on the local community, the workers implementing the action, and the environment are included.

Long-term effectiveness addresses the level of risk remaining after the action has been completed and the need for addition of controls. The degree to which the alternative reduces toxicity, mobility or volume of contamination and how this in turn reduces risk or potential threats is also discussed.

This section must summarize ARARs for the proposed IM/IRA action. The requirements should be presented as a summary table in the IM/IRA Decision Document, with a brief discussion in the text of this section. The alternatives evaluation will include a discussion, in general terms, of whether or not they can be complied with and what cost and schedule impacts pertain to each alternative. A detailed ARARs evaluation will be included elsewhere in the IM/IRA.

2.2 IMPLEMENTABILITY

This criteria addresses the technical and administrative feasibility of implementing an alternative and the availability of the services and materials required. Technical feasibility relates to the maturity and complexity of the technology being evaluated. Construction feasibility, and operations and maintenance requirements are also considered.

Administrative feasibility relates to the need for coordination with other offices and agencies, such as requirements for building permits, easements, or zoning variances. Availability of services and materials relates to the need for skilled labor/technicians to operate the technology/process, offsite treatment/storage/disposal, utilities, and laboratory services.

Finally, the implementability criteria includes a consideration of the acceptability of the alternatives to the State and local community.

2.3 COST

Evaluation of costs should consider the capital costs to engineer, procure, and construct the required equipment and facilities, and the operating and maintenance costs associated with the alternative. The cost estimates can be "order-of-magnitude" with sufficient accuracy to allow comparison and ranking of the alternatives on a present worth basis for alternatives that involve more than one year of operation and maintenance. For the alternative evaluation section of the IM/IRA, the alternatives will be compared on a qualitative basis using descriptors such as high, medium, or low.

The results of the analysis will be presented in the IM/IRA Decision Document for each alternative evaluated. This analysis will be summarized in a table similar to Table 2-1.

Based on the analysis, a decision will be made as to whether or not each alternative considered should be retained for the comparative analysis, which is discussed in the next section. The reason for eliminating an alternative should also be discussed.

Table 2-1 Initial Screening of Alternatives

EFFECTIVENESS
Protectiveness
Public Health
Workers
Environment
Attains ARARs
Achieve Remedial Objectives
Level of treatment/containment
No residual effect concerns
Maintains control until long-term solution implemented
IMPLEMENTABILITY
Technical Feasibility
Construction and operation
Demonstrated performance
Adaptable to environmental conditions
Need for permits
Availability
Equipment
Personnel and services
Outside laboratory testing
Offsite treatment and disposal
Post-removal site control
Administrative Feasibility
Permits required
Easements of right-of-ways required
Impact on adjoining property
Ability to impose institutional controls

COST

Capital Cost
Operation and Maintenance
Present worth cost

2.4 COMPARATIVE ANALYSIS OF ALTERNATIVES

Alternatives that pass the initial screening based on effectiveness, implementability, and cost are now compared against each other. At this point a remedy may be selected if there is an obvious benefit to a single remedy during the initial screening. The purpose of the comparative analysis is to identify the advantages and disadvantages of each alternative relative to one another so that one of them can be identified as the recommended action.

The actual comparison may be made on a semi-quantitative ranking system based on effectiveness, implementability and cost. After each category has been scored, a total score (low, medium, high) is obtained. The alternative with the highest score would probably be the recommended alternative, assuming that it is cost effective. Generally, a matrix indicating the relative scores of the alternatives and the justifications for the scores is the best method for presentation.

If there is no best alternative by this method, it may be necessary to add additional criteria and/or weighing factors to the criteria to differentiate between the alternatives.

2.5 RESPONSIVENESS SUMMARY

The approved responsiveness summary from the public comment period will be attached to the final approved IM/IRA.

3.0 GENERIC IM/IRA SCHEDULE

The attached generic schedule is for the development of an IM/IRA. Variations for each IHSS may influence the duration of specific activities. This schedule may be used as a planning basis.

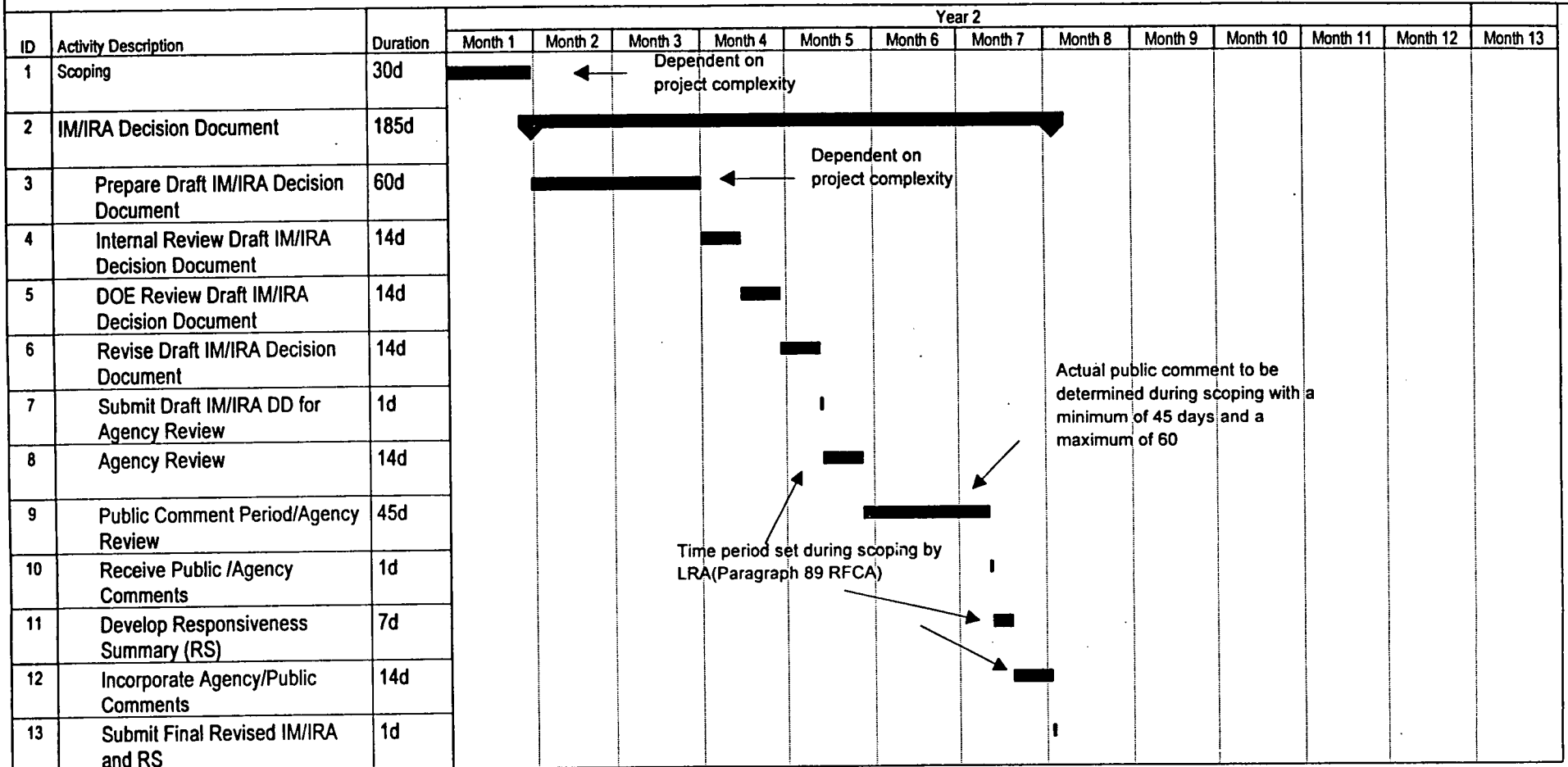
4.0 COMMENT RESPONSIVENESS SUMMARY

This section will be included to document responses to public and agency comments if a separate responsiveness summary is not created.

5.0 DECISION MODIFICATION PROCESS

The decision modification process for IM/IRAs is discussed in Section 3.10 of the IGD, and in Part 10 of the RFCA.

Generic IM/IRA Schedule



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"Final Rocky Flats Cleanup Agreement"

Appendix D

PREPARATION OF AN ER PROPOSED ACTION MEMORANDUM

APPENDIX D

1.0 PREPARATION OF AN ER PROPOSED ACTION MEMORANDUM

1.1 PAM FORMAT

RFCA ¶106 describes the PAM process:

The Draft PAM shall contain a brief summary of data for the site; a description of the proposed action; an explanation of how waste management considerations will be addressed; an explanation of how the proposed action relates to any long-term remedial action objectives; proposed performance standards; all ARARs and action levels related to the proposed action; and an implementation schedule and completion date for the proposed action.

The PAM is the decision document for accelerated response action requiring less than six months for project execution. The length and complexity of the PAM will depend on the complexity of the project. The development of the sections included in a PAM is discussed in the following sections.

The sections of a PAM include:

- Purpose
- Project Description
- Background
- Project Approach
- Environmental Impacts
- Compliance with ARARs
- Implementation Schedule
- Comment Responsiveness Summary

1.2 PURPOSE

This introduction briefly states:

- The nature of the contamination
 - The proposed action
-

- the intent or goal of the proposed action

1.3 SITE DESCRIPTION

The project description provides site information including history, geological and hydrogeological conditions, remedial investigation data, a brief summary of risks posed by the site and how the action will mitigate the risks. This section will also include a brief description of how the proposed action is consistent with any long-term remedial objectives. If appropriate, the Background, General Conditions, and Data Summary subsections can be combined into one section entitled Existing Conditions and Conceptual Model. The section would contain the same information and integrate it into a conceptual model of the site, including known and expected contaminant distribution and factors expected to impact the project (e.g., shallow groundwater).

1.3.1 Background

The background section describes the nature and history of the contamination source. This potentially includes historical information on spills or other types of releases, any waste operations associated with the contamination, and the relationship between the contamination and other IHSSs.

1.3.2 General Conditions

This summary describes site-specific conditions or pertinent data to support the rationale for undertaking the action such as the geological and hydrogeological conditions of the area to be mitigated. Information relevant to the action may include:

- Underlying stratigraphy
- Depth to groundwater
- Saturated thickness
- Mean hydraulic, conductivity, and gradient
- Seasonal effects
- Any relevant information on seeps or surface water locations

Only information relevant to the proposed action should be discussed. General discussions of the site geology, geographic setting, and other physical characteristics should be referenced to existing documents.

1.3.3 Data Summary

This section summarizes past remedial investigations. This would include, if relevant:

- Geophysical survey information
- Borehole sampling results
- Groundwater sample results
- Surface water sample results
- Surface soil, sludge, or sediment sample results
- Field screening results
- Free product samples and thickness measurements
- Samples and smears from tanks and pipelines
- Field observations
- Any other appropriate, available historical data

1.4 PROJECT APPROACH

This section provides a brief and concise statement of the intended objective of the accelerated action.

1.4.1 Proposed Action Objectives

This section details the proposed action including the scope of the action, the proposed remediation methodology, cleanup levels, and site restoration. Where applicable, these details would include information on:

- The scope or extent of the action including projected volumes of any environmental media removed and/or treated
 - Excavation methods
 - Material handling
 - Groundwater or surface water recovery methods
 - Treatment methods for water, soils, sediments, debris, or excess equipment, including tabulated performance standards for treatment
 - Transportation or staging requirements
 - Any control measures to minimize the environmental impact of the proposed action, (e.g., dust suppression, and containment measures)
-

- Performance monitoring in accordance with the IMP
- site restoration including any revegetation, backfilling, or regrading

Discussion of sampling and analysis will be deferred to the project-specific sampling and analysis plan developed as per the guidelines in Section 3.2 of the IGD.

1.4.2 Worker Health and Safety

This section will include a brief description of the basis for health and safety requirements, the hazards, monitoring requirements, PPE, and actions to protect human health. An action-specific HASP will be prepared separately.

1.4.3 Waste Management

This section will describe the storage and management requirements and final disposition of all waste streams that will be generated. Remediation wastes are defined in RFCA ¶25bf as:

Remediation waste means all:

- 1) *Solid hazardous, and mixed wastes;*
- 2) *All media and debris that contain hazardous substances, listed hazardous or mixed wastes that exhibit a hazardous characteristic; and*
- 3) *All hazardous substances generated from activities regulated under this Agreement as RCRA corrective Actions or CERCLA response actions, including decommissioning.*

Remediation waste does not include wastes generated from other activities. Nothing in this definition confers RCRA or CHWA authority over source, special nuclear, or byproduct material as those terms are defined in the Atomic Energy Act.

1.5 NEPA

This section is included to identify how NEPA values are incorporated into the decision document. Ideally the NEPA values will be woven throughout the decision document so that they are considered at all phases of the decision making. This section provides an opportunity to reiterate how NEPA values may have been considered in other parts of the

decision document, and to touch upon other NEPA values that may not have been directly addressed. The NEPA values to be considered include:

- Air quality during construction and operation of the project
- Water quality (including both surface water, wetlands, and groundwater and the flow characteristics of each)
 - Flora and fauna (including threatened and endangered species)
- Historic and cultural resources
- Human health
- Limited consideration of alternatives including no action, as appropriate
- Irreversible and irretrievable commitment of resources
- Short-term versus long-term use of the proposed site
- Indirect effects
- Cumulative effects (effects from the current project added to the effects from other known projects affecting the same site)

1.6 COMPLIANCE WITH ARARS

This section consists of an analysis of federal and state ARARs. Chemical-specific, location-specific, and action-specific ARARs are identified and summarized in a table. Section 3.5 of the IGD discusses identification and evaluation of ARARs.

1.7 IMPLEMENTATION SCHEDULE

This is a general project schedule including commencement of field activities and report generation. The format of the schedule will be project-specific. Milestones will only be presented at a summary level with nonspecific dates (e.g., "field activities will commence in the second quarter of 1999"). The attached generic schedule for PAMs may be used as a starting point for project planning.

1.8 COMMENT RESPONSIVENESS SUMMARY

This section will be included if a separate responsiveness summary is not created. Written comments from the public comment process will be documented followed by responses to individual or group comments that have similar focus.

1.9 DECISION MODIFICATION PROCESS

The decision modification process for PAMs is described in Section 3.10 of the IGD.

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Based on good cause,
LRA may extend 7 days →

Task

Progress

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Appendix E

NO FURTHER ACTION DEVELOPMENT SCHEDULE

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GENERIC NFA SCHEDULE

ID	Task Name	Duration	Week 1			Week 2			Week 3			Week 4			Week 5			Week 6			Week 7			Week 8			Week 9			Week 10			We							
			1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39	41	43	45	47	49	51	53	55	57	59	61	63	65	67	69	71		
1	Prepare NFA Documentation	14d																																						
2	Submit NFA to HRR	3d																																						
3	Prepare HRR for Annual Agency Submittal	7d																																						
4	Submit HRR to Agencies	1d																																						
5	Agency Review	21d																																						
6	Recieve Agency Comments	1d																																						
7	Resolve Agency Comments	7d																																						
8	Revision	7d																																						
9	Submit to Agencies for Approval	1d																																						
10	Agency Approval for Release	7d																																						

Project: Generic NFA Schedule

Task

Progress

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“Final Rocky Flats Cleanup Agreement”

Appendix F

PROPOSED PLAN AND CAD/ROD SCHEDULE

APPENDIX F

1.0 PROPOSED PLAN AND CAD/ROD SCHEDULE

Appendix F includes a generic schedule for the development of a PP/CAD/ROD. While actual activity durations may vary according to the complexity of the IHSS. This schedule may be used for planning purposes.

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h8L/eq9

GENERIC CAD/ROD SCHEDULE

ID	Task Name	Duration	Month 1				Month 2				Month 3				Month 4				Month 5				Month 6				Month 7				Month 8				Month 9				Month 10					
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42
1	Develop Draft Proposed Plan	21d																																										
2	Internal Review	7d																																										
3	Revision of Draft	7d																																										
4	Submit Draft PP to Agencies	1d																																										
5	Agency Review	14d																																										
6	Receive Agency Comments	1d																																										
7	Develop Comment Responses	7d																																										
8	Comment Resolution Meeting	1d																																										
9	Revise Draft PP	14d																																										
10	Submit Final PP to Agencies	1d																																										
11	Agency Review and Approval	7d																																										
12	Open Public Comment Period	45d																																										
13	Compile Public Comments	7d																																										
14	Agree on Public Comments	7d																																										
15	Develop Comment Responses	14d																																										
16	Prepare Responsiveness Summary	7d																																										
17	Document Production	7d																																										
18	Submit Responsiveness Summary	1d																																										
19	Agency Review	7d																																										
20	Incorporate Comments and Finalize	7d																																										
21	Develop Preliminary Draft ROD	30d																																										
22	Internal Review and QA	7d																																										
23	Final Revision and Document Production	7d																																										
24	Submit Draft CAD/ROD for Agency Review	1d																																										
25	Agency Review	14d																																										
26	Recieve Agency Comments	1d																																										
27	Develop Comment Resposes	7d																																										
28	Comment Resolution Meeting	1d																																										
29	Revision	14d																																										
30	Submit to Agencies for Review	1d																																										
31	Agency Approval for Release	14d																																										
32	Incorporate Final Agency Comments	7d																																										
33	Release CAD/ROD to Public	1d																																										

Project: Generic CAD/ROD Schedule

Task

Progress

Appendix G

**GENERIC RCRA FACILITY INVESTIGATION/REMEDIAL
INVESTIGATION SCHEDULE**

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APPENDIX G

1.0 GENERIC RCRA FACILITY INVESTIGATION/REMEDIAL INVESTIGATION SCHEDULE

Contents

The contents of an RFI/RI Report may include, but is not limited to the following:

- Description of the IHSS
- A summary of all field activities
- Presentation of all field data
- Location and characteristics and source(s) of contamination
- Definition on nature, extent, fate, and transport of contaminants
- Identification of sources which impact surface water
- Evaluation of risks

A generic schedule for the development of an RFI/RI Report is included. While actual activity durations may vary according to the complexity of the IHSSs, this schedule may be used for planning purposes.

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GENERIC RFI/RI SCHEDULE

ID	Task Name	Duration	Month 1	Month 5	Month 9	Month 13	Month 17	Month 21	Month 25	Month 29
1	Develop RFI/RI Work Plan	30d	█							
2	Internal Review	14d	█							
3	Recieve Comments	1d	█							
4	Revise Workplan	7d	█							
5	Submit to Agencies for Review and Comment	1d	█							
6	Agency Review	14d	█							
7	Recieve Agency Comments	1d	█							
8	Resolve Agency Comments	14d	█							
9	Revise Workplan	14d	█							
10	Submit Workplan for Approval	1d	█							
11	Agency Review and Approval	7d	█							
12	Prepare for Fieldwork	90d		█						
13	Perform Fieldwork	60d			█					
14	Recieve Analytical Results	0d								
15	Develop RFI/RI Report and HHRA	90d				█				
16	Preliminary Review RFI/RI Report	14d				█				
17	Revise Preliminary Draft	21d					█			
18	Document Production	114d					█			
19	Submit RFI/RI Report for Agency Review	1d						█		
20	Agency Review	30d						█		
21	Develop Comment Responses	14d							█	
22	Submit Comment Responses to Agencies	1d							█	
23	Agency Review of Comment Responses	14d							█	
24	Revise RFI/RI Report	30d							█	
25	Document Production	14d							█	
26	Submit Final RFI/RI to Agencies	1d								█

Project: Generic RFI/RI Schedule

Task  Progress 

Appendix H

CORRECTIVE MEASURES STUDY/ FEASIBILITY STUDY PREPARATION

APPENDIX H

1.0 CORRECTIVE MEASURES STUDY/FEASIBILITY STUDY PREPARATION

The CMS/FS report summarizes the results of the RFI/RI and the baseline risk assessment. Based upon that summary, risk and ARARs-based narrative remedial action objectives and where appropriate numeric remedial action goals are developed. Based upon the statement of objectives and goals, technologies are identified and evaluated for feasibility, screened against the criteria enumerated in the NCP, and ultimately compared one against another.

A suggested outline for the development of the CMS/FS is discussed in the following sections. It must be understood that the remedial action objectives control the types of technologies and process options considered.

The sections of a CMS/FS include:

- Executive Summary
- Introduction
- Site Characteristics
- Corrective/Remedial Action Objectives
- Identification and Screening of Alternatives
- Detailed Analysis of Alternatives
- Selected Alternative (Optional)

1.1 EXECUTIVE SUMMARY

The Executive Summary outlines the site characteristic, risk factors, and ARARs considerations essential to developing the remedial action objectives and then clearly presents the remedial action objectives. The processes and factors that proved crucial to identifying and framing alternatives are then highlighted and followed by a comparison of each alternative to the nine criteria. The selected alternative may then be presented with further discussion of relevant factors that demonstrate satisfaction of the criteria.

1.2 INTRODUCTION

The introduction provides information as to the framework to which the CMS/FS is being prepared, a list of acronyms and an outline of each section of the report.

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1.3 SITE CHARACTERISTICS

This section describes the nature and history of the contamination source(s).

1.4 CORRECTIVE/REMEDIAL ACTION OBJECTIVES

This section summarizes the risk assessment, provides an overview of location and action specific ARARs, and defines chemical specific ARARs. The risk assessment results and ARARs are then used to develop narrative remedial action objectives, and, where appropriate, numeric remedial action goals.

1.5 IDENTIFICATION AND SCREENING OF ALTERNATIVES

Based upon the narrative remedial action objectives and numeric remedial action goals, remedial technologies and process options are first identified and screened. The remedial technologies and process options are then assembled into alternatives, and screened as to effectiveness, implementability and relative cost.

1.6 DETAILED ANALYSIS OF ALTERNATIVES

The alternatives which are retained following the screening are now further refined as to technical detail and cost. The refined alternatives are then evaluated against the nine evaluation criteria:

- Overall protection of human health and the environment
- Attainment of ARARs
- Long-term protectiveness
- Short-term effectiveness
- Implementability
- Cost
- State acceptance
- Community acceptance

1.7 SELECTED ALTERNATIVE

During project scoping the stakeholders will determine if the selected alternate and analysis leading to the selected alternative is provided in the CMS/FS or under separate cover. The section provides an analysis that makes comparisons among alternatives. The selected alternative is then future described to show how it satisfies the nine criteria.

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GENERIC CMS/FS SCHEDULE

ID	Task Name	Duration	Month 1				Month 2				Month 3				Month 4				Month 5				Month 6				Month 7				Month 8				Month 9																											
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36		37	38	39	40																			
1	Prepare Draft CMS/FS	60d																																																												
2	Internal Review Draft CMS/FS	14d																																																												
3	Revise Draft CMS/FS	14d																																																												
4	Submit Draft CMS/FS for Agency Review	1d																																																												
5	Agency Review	30d																																																												
6	Recieve Agency Comments	1d																																																												
7	Develop Comment Resposes	14d																																																												
8	Comment Resolution Meeting	1d																																																												
9	CMS/FS Revision Per Comment Resolution Meeting	14d																																																												
10	Agency Approval for Release	14d																																																												
11	Public Comment Period	30d																																																												
12	Incorporate Public Comments	14d																																																												
13	Submit Revised CMS/FS	1d																																																												
14	CMS/FS Approval	7d																																																												
15	Incorporate Final Agency Comments	14d																																																												
16	Final Agency Approval	0d																																																												

Project: GENERIC CMS/FS SCHED

Task

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Appendix I

OUTLINE OF SAMPLING AND ANALYSIS PLAN

APPENDIX I

1.0 OUTLINE OF SAMPLING AND ANALYSIS PLAN

The following SAP outline is based on *Guidance for Conducting Remedial Investigation and Feasibility Studies Under CERCLA* (EPA, 1988a) and reflects current RFETS usage. Each SAP will vary, however, depending on the data and sample requirements. SAPs will generally include information on the following topics:

- Background information
- Sampling rationale
- DQOs
- Sampling activities and methodology
- Data management
- Project organization
- Health and Safety Plan
- Quality Assurance
- Schedule

These outline topics are described in the following sections.

2.0 INTRODUCTION

The introduction will provide a brief project background and description including:

- Purpose/objectives of the SAP
 - History of the site to be sampled (identify IHSSs, PACs or RCRA units in the area)
- Summary of existing data with an assessment of its adequacy
- Description of the project including planned field activities
- Hydrogeologic setting (if appropriate to the project).

3.0 SAMPLING RATIONALE

This section will discuss the reasons and justification used to develop sampling factors such as number of samples, location, depths, frequency, COCs, and analytical methods.

Conditions of the physical setting which influence these factors can also be discussed.

This section should typically include a brief conceptual model to identify and document the potential field conditions, factors that may impact sampling results, and potential for free product to be present. The conceptual model is intended to show how the site works physically and chemically in terms of expected conditions. The model may be presented as a cross-section of the contaminant distribution and potential transport mechanisms or items, structures, and physical conditions that may impact the project (e.g., presence of drums, depth to bedrock, depth to groundwater, steep slopes, location of surface water).

4.0 DATA QUALITY OBJECTIVES

The DQO process, as described in Section 3.2, is a structured decision-making process that requires the identification of and agreement on decisions for which data are required. The process results in the full set of specifications needed to develop a protective and compliance sampling program (i.e., qualitative and quantitative statements that specify the type, quality, and quantity of the data required to support decision making). The formal DQO process is documented in two EPA documents (EPA, 1993; EPA, 1994). Specific steps in the DQO process include:

- Identify and define problem(s) to be solved
- Identify decision(s) to be made relative to the problem
- Identify inputs to the decision (data needed to make decision)
- Define study boundaries/scope of problem and decision
- Develop decision rule(s) [IF/THEN action statement(s)]
- Specify limits on decision errors (acceptable types and degrees of uncertainty)
- Develop and optimize design for obtaining data

These steps are described below.

4.1 The Problem

Implementation of a sampling plan requires identification and disposition of contaminated media, materials, and equipment that were produced in past processes, especially relative to free release (of materials) or management of particular waste types or streams. Adequate samples must be taken to properly characterize and manage the materials and/or equipment, whether it is waste or not.

Other decisions or subdecisions that support final project actions may be put forth in the form of following questions, provided that the answers or conclusions relate directly to project decisions, e.g:

- Why perform this characterization?
- What is the final disposition of the material, equipment, facility, or structure (free release, restricted use, low level waste, etc.)?

4.2 The Decisions

The critical technical decisions for a typical project are as follows, understanding that decisions may vary relative to goals of the project:

- What materials (e.g., paint, concrete, pipe insulation, etc), media (e.g., soil, water, oil, solid, sludge, etc), or equipment within the facility or area are contaminated or, conversely, not contaminated
- What are the generic classification categories by which the materials, equipment, and/or media will be managed, relative to an eventual assignment as contaminated (hazardous, radiological, or mixed) or not contaminated (nonhazardous)? In other words, what are the categories of waste streams that will result from the activity? What are the ultimate dispositions (i.e., waste classifications and treatment, storage, and disposal [TSD] facilities) of the waste streams, including quantities (e.g., a completed summary table)?

4.3 Inputs to the Decisions

Inputs to the decisions are data, both qualitative and quantitative. Qualitative information will typically consist of nominal data (e.g., paint color, texture, or equipment type, etc) derived from visual observation of the building's equipment and materials. Quantitative data may be produced from analytical, radiochemistry, radiation surveys or petrographic analysis (asbestos) of samples. Waste Acceptance Criteria (WAC) are typically the drivers for decision inputs where data will be used to characterize waste streams destined for a particular TSD facility (e.g., NTS, Envirocare or USA waste). Inputs to the decisions are COC-specific.

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Inputs to the decision must also include, directly or in other subsections, the following:

- analytical/radiochemistry results
- radiation survey results
- method-specific sensitivities (detection limits or minimum detectable activities)
- error tolerances associated with the measurements (e.g., accuracy and precision)
- action levels (regulatory thresholds)

Although professional judgment is instrumental, sampling must err to the conservative (i.e., collecting more samples) if there is any doubt regarding homogeneity of the materials sampled.

Other decisions or subdecisions that support final project actions may be put forth in the form of following questions, provided that the answers or conclusions relate directly to project decisions:

- What information is required to make this decision?
- What source(s) can be used to obtain the information?
- Can the desired analysis be done at RFETS or will the samples be shipped off-site for analysis?
- What types and kind of sampling measurements are required?
- What type of instrumentation is required?
- Has facility structural data been reviewed?
- What suspect materials have been identified?
- What are the required instrumentation sensitivities?
- What method will be used to obtain the desired information?
- What Quality Assurance (QA) program requirements are there for these samples (i.e., blanks, duplicates)?
- What number of samples/measurements will provide the desired certainty?
- Have data quantity and quality control requirements for sampling been reviewed?

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4.4 Project Boundaries

Project boundaries describe the geographic, three-dimensional areas, and temporal boundaries of the characterization activity. Other decisions or subdecisions that support final project actions may be put forth in the form of following questions, provided that the answers or conclusions relate directly to project decisions:

- What is the sample population of interest?
- Are there any constraints on data collection?

4.5 Decision Rules and Error Limits

Decision rules must be based on objective, reproducible, and verifiable, measurable criteria. If the decision is statistically based, decision error must address both the producer's (alpha) error and the consumer's (beta) error. "False Positive" error is usually equivalent to the alpha error while the "false negative" is equivalent with beta error, although this determination hinges on the way in which the hypothesis test is setup. Alpha and beta error typically range from 1% to 10% (i.e., confidences from 99% to 90%, respectively), based on standard statistical practice and historical acceptance by the regulators (public, CDPHE, and EPA Region VIII).

Decisions may also be based directly on protocols promulgated by the regulators, for example determination of asbestos. Other decisions or subdecisions that support final project actions may be put forth in the form of the following questions, provided that the answers or conclusions relate directly to project decisions.

- What is the basis for the decision?
- Are there any regulatory and statistical drivers for sampling frequency?
- What action levels are applicable to the discussion or parameter of interest?
- Define the discussions using "If ... then ..." statements (e.g., if paint containing >50 ppm PCBs is identified then all resulting waste material will be handled as TSCA waste)

4.6 Optimization of Design

Modifications to the DQOs are typically based on visual observations, new information revealing data gaps as the project progresses, and professional judgement,

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all of which are documented and are discussed in the Data Quality Analysis section of the final report.

Acquisition of a sample directly depends on the sampling team's observations of the material, equipment, equipment components, or media of interest. If data gaps are identified subsequent to the characterization sampling and decisions described herein (i.e., the decision can not be made with confidence), additional sampling of source materials and/or waste streams will be conducted.

Analytical data collected in support of specific projects will be evaluated using the guidance established by the Rocky Flats Administrative Procedure 2-G32-ER-ADM-08.02, *Evaluation of ERM Data for Usability in Final Reports (RMRS 1994e)*. This procedure establishes the guidelines for evaluating analytical data with respect to PARCC parameters. Data validation will be performed according to the RFETS, Analytical Services Division (ASD) procedures and will be done after the data are used for their intended purpose.

5.0 SAMPLING ACTIVITIES AND METHODOLOGY

This section describes what information sampling methodology and the locations. Figures may be provided in the SAP for clarity, and available information may be presented about the samples, including:

- Number of samples in each media
- Grid spacing or sample location
- Sample depths
- Criteria for selection of additional samples
- Sample numbering
- Type and frequency of QA/QC samples
- Sample analysis (method numbers)

For each medium, describe the above information in the text and, as appropriate, provide a table enumerating the samples to be collected, rationale for each sample, analysis method (and method number), amount and types of QC samples, the type of container, preservative, and holding time. These tables should include project requirements and collection locations, where appropriate. The overall QA/QC requirements including field duplicates and blank samples analytical detection limits, and standards for accuracy and completeness are provided in the IMP.

Sample handling, including chain-of-custody and packaging procedures, should be performed according to ER procedure 4-B29-ER-OPS-FO.13 *Containerization, Preserving, Handling and Shipping of Soil and Water Samples* (RMRS, 1994c).

This section should briefly describe of how samples will be numbered and labeled in the field. Sample numbers are assigned by the SWD or ASD. It is strongly recommended that sample numbers be obtained from SWD and included in the SAP. Numbers from the assigned block of samples will be assigned if additional samples are needed. If only field-screening data will be collected, describe a systematic method that will be used to number sample locations, depths and analytical results.

6.0 DATA MANAGEMENT

A project field logbook should be created and maintained by the project manager or designee in accordance with site Procedures 2-S47 ER-ADM-05.14, *Use of Field Logbooks and Forms* (RMRS 1995b) and 4-B29-ER-OPS-FO.14 *Field Data Management* (RMRS, 1994d). The logbook should include time and date of all field activities, sketch maps of sample locations, or any additional information not specifically required by the SAP. The originator should legibly sign and date each completed original hard copy of data. Appropriate field data forms should also be utilized when required by operating procedures that govern the field activity. Sample designations will appear in the logbook and on the field data forms. A peer reviewer should examine each completed original hard copy of data. Any modifications will be indicated in ink, and initialed and dated by the reviewer. Logbooks will be controlled through RMRS Document Control.

Analytical data record storage for this project will be performed by ASD. Sample analytical results will be delivered directly from the laboratory to the APO in an Electronic Data Deliverable (EDD) format and archived in the SWD. Hard copy records of laboratory results will be obtained from the APO in the event that the analytical data is unavailable in EDD or SWD at the time of report preparation. Analytical results will be compiled into a sampling and analysis results report. Additional data management discussion is provided in Section 3.4 of the main text.

7.0 PROJECT ORGANIZATION

If the SAP is not part of a document which already includes a project organization section, it should be described here. An organization chart should be included, at a minimum, that will

include the project manager, sample team lead, and the appropriate quality assurance and safety personnel.

8.0 HEALTH AND SAFETY PLAN

The Health and Safety Plan (HASP) used to control work should be referenced. In addition to the site-wide HASP, a project-specific HASP will usually have been developed for the PAM or IM/IRA being implemented. If only sampling activities are to be performed, a separate HASP may be needed to cover the activity.

9.0 QUALITY ASSURANCE

This section should reference the site-wide Quality Assurance Project Plan and then address the project-specific quality requirements, including the following elements:

- The 10 DOE quality criteria (Per DOE Order 5700.6C or 10 CFR 830.120) and including relevant parts of American National Standards Institute/American Society of Quality Control (ANSI/ASQC) E4, as applicable
- Sampling method, including specialized or specific equipment or instrumentation
- Collecting Decision logic for fewer or greater numbers of samples than those specified in the SAP
- QC sample types and quantities
- Specific analytical and/or radiochemistry methods and method numbers [e.g., SW-846, ANSI/ASQC, and American Society of Testing and Material, etc]
- Sample management requirements, including preservation, chain of custody, and shipping
- Data management and reduction requirements, including hardcopies and digital data
- Modeling of software/hardware verification/validation

10.0 REFERENCES

Provide the references used to generate the SAP, if appropriate. This will include documents used to develop the background and site descriptions.

Appendix J

RFETS MASTER LIST OF POTENTIAL ARARS

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Requirement	Citation	Type	Comment
ATOMIC ENERGY ACT (AEA) [42 USC 2200 et. seq.]			
RADIATION PROTECTION OF THE PUBLIC AND THE ENVIRONMENT <ul style="list-style-type: none"> Radiation Protection Standard - All Pathways Radiation Protection Standard - Airborne Emissions Radiation Protection Standard - TRU Waste Storage/Disposal ALARA Process Effluent Discharges to Surface Waters Effluent Discharges to Sanitary Sewer Systems Residual Radioactivity Levels (Real Property, Materials, and Equipment) Monitoring and Surveillance 	DOE Order 5400.5 (10 CFR 834, Proposed) Chapter II.1a and III (834.101) Chapter II.1b (834.102) Chapter II.1c (834.109) Chapter II.2 (834.11) Chapter II.3a (834.201) Chapter II.3d (834.203) Chapter II.5 and IV (834, Subpart D) Chapter II.6 (834.10)	TBC	This DOE Order establishes criteria for the protection of human health and the environment to ensure radiation exposure resulting from DOE activities does not exceed an effective equivalent dose for 100 mrem per year. This radiation dose limit also forms the basis for the release of radionuclides to the environment and the release of properties for unrestricted use.

Requirement	Citation	Type	Comment
ATOMIC ENERGY ACT (AEA) [42 USC 2200 et. seq.]			
RADIATION PROTECTION OF THE PUBLIC <ul style="list-style-type: none"> Radiation Protection Standard - All Pathways Effluent Discharges to Sanitary Sewer Systems Treatment or Disposal by Incineration Disposal of Specific Waste Radiological Criteria for Unrestricted Use Criteria for License Termination under Restricted Condition Alternate Criteria for License Termination 	10 CFR 20 .1301 .2003 .2004 .2005 .1402 .1403 .1404	TBC TBD	For onsite response actions, NRC requirements are not applicable to CERCLA activities conducted at the RFETS; DOE is required to and has established programs to manage radioactive operations and waste. Although NRC regulations may be relevant, these NRC standards are not considered to be appropriate if DOE Orders adequately establish standards of control for the management of radioactive materials to ensure protection of human health and the environment. In cases where a DOE Order specifies requirements that are inconsistent with NRC standards, the DOE requirement will be followed unless specifically waived by DOE in order to adopt the NRC standard. The status of these requirements is being evaluated pending issuance of NRC guidance.
RULES AND REGULATIONS PERTAINING TO RADIATION CONTROL <ul style="list-style-type: none"> Permissible Levels of Radioactive Material in Uncontrolled Areas 	6 CCR 1007-1, Part 4 4.60.1	TBC	

A - Action-Specific ARAR; C - Chemical-Specific ARAR; L - Location-Specific ARAR; TBC - To Be Considered; TBD-To Be Determined

Requirement	Citation	Type	Comment
ATOMIC ENERGY ACT (AEA) [42 USC 2200 et. seq.]			
RADIOACTIVE WASTE MANAGEMENT <ul style="list-style-type: none"> • Management of Transuranic Waste • Temporary Storage at Generating Sites • Management of Low-Level Waste • Performance Objectives • Performance Assessment • Waste Characterization • Disposal • Disposal Site Closure/Post Closure • Environmental Monitoring 	DOE Order 5820.2A Chapter II 3e Chapter III 3a 3b 3e 3I 3j 3k	TBC	
ENVIRONMENTAL RADIATION PROTECTION STANDARDS FOR MANAGEMENT AND DISPOSAL OF SPENT NUCLEAR FUEL, HIGH-LEVEL AND TRANSURANIC RADIOACTIVE WASTES <ul style="list-style-type: none"> • Radiation Dose Standard 	40 CFR 191 .03	C	Standard applies to transuranic wastes only.
OCCUPATIONAL RADIATION PROTECTION	10 CFR 835	TBC	

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Requirement	Citation	Type	Comment
ATOMIC ENERGY ACT (AEA) [42 USC 2200 et. seq.]			
LICENSING REQUIREMENTS FOR LAND DISPOSAL OF RADIOACTIVE WASTE	10 CFR 61	TBC	
<ul style="list-style-type: none"> • Radiation Protection • Access Restrictions • Future Impacts • Site Siting/Stability • Drainage Controls/Floodplains • Final Cover • Buffer Zone • Groundwater Monitoring • Waste Disposal Requirements 	.41 & .52 .42 .50 .44 .51 .51 .52 .53 .56		
CLEAN AIR ACT (CAA) [42 USC 7401 et. seq.]			
AMBIENT AIR QUALITY STANDARDS	5 CCR 1001-14 [40 CFR 50]	C	<p>Ambient air quality standards are considered to be chemical- specific ARARs to assess the quality of ambient air and the need to remediate a particular IHSS to maintain the quality of the ambient air. RFETS is located in a non-attainment zone for particulate matter and ozone.</p> <p>Ambient air quality standards are not effluent discharge limitations; they are used in conjunction with air dispersion modeling to establish discharge limits that are protective of air quality.</p>

A - Action-Specific ARAR; C - Chemical-Specific ARAR; L - Location-Specific ARAR; TBC - To Be Considered; TBD-To Be Determined

Requirement	Citation	Type	Comment
CLEAN AIR ACT (CAA) [42 USC 7401 et. seq.]			
COLORADO AIR POLLUTION REGULATIONS <ul style="list-style-type: none"> Emission Control Regulations for Particulates, Smokes, Carbon Monoxide, and Sulfur Oxides <ul style="list-style-type: none"> - Particulates - Emission Monitoring Requirements for Existing Sources - Sulfur Dioxide Emission Regulations Odor Emissions Air Pollutant Emissions Notices Standards of Performance for New Stationary Sources Emissions of Volatile Organic Compounds Control of Hazardous Air Pollutants Emissions of Ozone-Depleting Compounds 	5 CCR 1001 [40 CFR 52, Subpart G] Regulation No. 1 [5 CCR 1001-3] Regulation No. 2 [5 CCR 1001-4] Regulation No. 3 [5 CCR 1001-5] Regulation No. 6 [5 CCR 1001-8] Regulation No. 7 [5 CCR 1001-9] Regulation No. 8 [5 CCR 1001-10] Regulation No. 15 [5 CCR 1001-19]	A	Regulation No. 1, Section III.D(2)(b), (e), (f), and (h) requires control measurements to be implemented for construction activities, haul roads, haul trucks, and demolition activities, respectively, to prevent the emission of fugitive particulates in excess of air standards. Other portions of Regulation No. 1 would be an ARAR only if the remedial action involves the specific emission source regulated. Regulation No. 2 prohibits odorous air contaminants from any single source to be emitted in detectable odors which are measured in excess of the air standards. Regulation Nos. 6, 7, 8, and 15 would be an ARAR only if the remedial action involves the specific emission source regulated.

A - Action-Specific ARAR; C - Chemical-Specific ARAR; L - Location-Specific ARAR; TBC - To Be Considered; TBD-To Be Determined

Requirement	Citation	Type	Comment
CLEAN AIR ACT (CAA) [42 USC 7401 et. seq.]			
NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS <ul style="list-style-type: none"> National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities <ul style="list-style-type: none"> - Standard - Emission Monitoring and Test Procedures - Compliance and Reporting National Emission Standards for Radon Emissions from Department of Energy Facilities <ul style="list-style-type: none"> - Standard - Exemption from the Reporting and Testing Requirements of 40 CFR 61.10 	40 CFR 61, Subpart H .92 .93 .94 40 CFR 61, Subpart Q .192 .193	C/A	Demonstration of compliance with 40 CFR 61.92 is performed on a sitewide basis taking into consideration all RFETS sources. Stack monitoring is required for all release points which could contribute greater than 0.1 mrem/yr.
FEDERAL WATER POLLUTION CONTROL ACT (aka Clean Water Act (CWA)) [33 USC 1251 et. seq.]			
WATER QUALITY CRITERIA – GOLD BOOK	33 USC 1314 (CWA Section 304)	C	The "Gold Book" presents guidelines with respect to water quality criteria for toxic pollutants. Criteria are published for aquatic and human health. The water quality criteria are not promulgated standards; however, they are established guidelines used for developing NPDES permits and may be considered potentially relevant and appropriate. WQC should not be used as effluent limits, rather discharge limits should be established either through the NPDES or UIC permitting process. Although water criteria are non-promulgated and non-enforceable standards, Section 121(d)(2)(B)(I) of

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Requirement	Citation	Type	Comment
FEDERAL WATER POLLUTION CONTROL ACT (aka Clean Water Act (CWA)) [33 USC 1251 et. seq.]			
			CERCLA as implemented by the NCP (40 CFR 300.430(e)(2)(I)(E)) specifies that WQC established under Sections 303 and 304 of the CWA shall be attained where relevant and appropriate under the circumstances of the release. The designated or potential use of the surface or groundwater, the environmental media affected, the purpose for which the WQC were developed, and the latest information are to be considered in determining the relevance and appropriateness of the WQC to the response action. Therefore, the need to comply with WQC as a relevant and appropriate requirement needs to be determined on a case-by-case basis using the factors listed above.
COLORADO BASIC STANDARDS AND METHODOLOGIES FOR SURFACE WATER <ul style="list-style-type: none"> • Antidegradation Rule • Water Quality-Based Designations • Basic Standards Applicable to Surface Waters of the State <ul style="list-style-type: none"> - Descriptive Standards for Substances from Point and Nonpoint Sources - Standards for Radioactive Materials - Standards for Organics • Salinity and Suspended Solids • State Use Classifications <ul style="list-style-type: none"> - Classifications - Areas Requiring Special Protection • Testing Procedures <ul style="list-style-type: none"> - Introduction – Numeric Levels 	5 CCR 1002-31 31.8 31.11 31.12 31.13 31.16,	C	Non-AEA radionuclides that have Statewide surface water standards will be considered potential ARARs. Site-specific standards not associated with a use classification and AEA regulated radionuclides are not ARARs because they do not meet the criteria of "general applicability" and/or enforceability in 40 CFR 300.400(g)(4) and are, therefore, not "promulgated."

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Requirement	Citation	Type	Comment
FEDERAL WATER POLLUTION CONTROL ACT (aka Clean Water Act (CWA)) [33 USC 1251 et. seq.]			
<ul style="list-style-type: none"> - Standard Test Procedures - Bioassay Procedures 	31.16, (2)(a) 31.16, (2)(b)		
COLORADO BASIC STANDARDS FOR GROUNDWATER <ul style="list-style-type: none"> • Classifications of Groundwater <ul style="list-style-type: none"> - Groundwater Classifications - Criteria Used to Identify Classifications for Groundwater - Specified Area • Groundwater Quality Standards <ul style="list-style-type: none"> - Narrative Standards - Numerical Standards - Statewide Standards • Point of Compliance 	5 CCR 1002-41, 41.4 41.5 41.5 (A) 41.5 (B) 41.5 (C) 41.6	C	Applicability or relevance and appropriateness to be resolved
TOXIC POLLUTANT EFFLUENT STANDARDS <ul style="list-style-type: none"> • Toxic Pollutants • Compliance 	40 CFR 129.4 40 CFR 129.5	C	If the permitted point is used, then the NPDES permit discharge standards would have been met.
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM REGULATIONS <ul style="list-style-type: none"> • Designation of Hazardous Substances • Determination of Reportable Quantities for Hazardous Substances • Applicability of Best Management Practices • Best Management Practices Programs 	40 CFR 116 40 CFR 117 40 CFR 125.102 40 CFR 125.104	A	These subparts are applicable to storage and use of products that contain toxic and hazardous pollutants above reportable quantity limitations, at a facility covered by an NPDES permit. No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely onsite, where such remedial action is selected and carried out in compliance with Section 121.

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Requirement	Citation	Type	Comment
FEDERAL WATER POLLUTION CONTROL ACT (aka Clean Water Act (CWA)) [33 USC 1251 et. seq.]			
DISCHARGES OF DREDGED OR FILL MATERIAL INTO WATERS OF THE UNITED STATES <ul style="list-style-type: none"> Discharges Requiring Permits 	33 USC 1344 33 CFR 323.3	A/L	Only substantive portions of the regulations are required under CERCLA actions for onsite activities.
DOE COMPLIANCE WITH FLOODPLAIN/WETLANDS ENVIRONMENTAL REVIEW REQUIREMENTS <ul style="list-style-type: none"> Floodplain/Wetlands Determination Floodplain/Wetlands Assessment Applicant Responsibilities 	10 CFR 1022 .11 .12 .13	A/L	
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
ENDANGERED SPECIES ACT (ESA) [16 USC 1531 et seq.]			
BIOLOGICAL ASSESSMENT <ul style="list-style-type: none"> Purpose Preparation Requirements Request for Information Director's Response <ul style="list-style-type: none"> No Listed Species or Critical Habitat Present Listed Species or Critical Habitat Present Verification of Current Accuracy of Species List Contents 	50 CFR 402.12	A/L	Substantive compliance with the ESA is the responsibility of each Federal agency. In cases where more than one Federal agency is involved in an action a lead Federal agency, as determined among the Federal agencies participating in the action, is designated. The burden of consultation as required under ESA Section 7 and subsequent preparation of a biological assessment if appropriate is the responsibility of the lead Federal agency. Federal agencies must use the consultation process to determine if their action poses an adverse impact to threatened and endangered species and their critical habitat. It is within the spirit of the act that Federal agencies also consider candidate species, especially those species that may be headed toward

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Requirement	Citation	Type	Comment
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
BIOLOGICAL ASSESSMENT CONT. <ul style="list-style-type: none"> • Identical/Similar to Previous Action • Permit Requirements • Completion Time • Submission of Biological Assessment • Use of Biological Assessment 			listing, in their environmental planning.
INTERAGENCY COOPERATION <ul style="list-style-type: none"> • Informal Consultation • Formal Consultation 	50 CFR 402 .13 .14	A/L	If an endangered species is found, then interagency cooperation is required. Otherwise, interagency cooperation is a TBC and the policy of DOE is that interagency cooperation will be complete. The U.S. Fish and Wildlife Service will be consulted as necessary to ensure that appropriate steps are taken pursuant to the ESA to protect Federal listed threatened and endangered species and their critical habitats.
LISTING ENDANGERED AND THREATENED SPECIES AND DESIGNATING CRITICAL HABITAT <ul style="list-style-type: none"> • Factors for Listing, Delisting, or Reclassifying Species • Criteria for Designating Critical Habitat 	50 CFR 424 .11 .12	A/L	
ENDANGERED AND THREATENED WILDLIFE AND PLANTS <ul style="list-style-type: none"> • List of Endangered and Threatened Wildlife • List of Endangered and Threatened Plants • Interagency Cooperation: Critical Habitats 	50 CFR 17 .11 .12 .94	A/L	Current lists of threatened and endangered species of animals and plants pertinent to the ESA and of concern to DOE-RFFO at the Site should be obtained from the U.S. Fish and Wildlife Service, Colorado Field Office.

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Requirement	Citation	Type	Comment
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
• Interagency Cooperation: Critical Habitats - Plants	.96		
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
MIGRATORY BIRD TREATY [16 USC 701-715]			
TAKING, POSSESSION, TRANSPORTATION, SALE, PURCHASE, BARTER, EXPORTATION, AND IMPORTATION OF WILDLIFE AND PLANTS	50 CFR 10	A/L	
• The Purpose of the Regulation	.1		
• List of Migratory Birds	.13		
• Law Enforcement Offices	.22		
• Civil Procedures	11		
EAGLE PROTECTION ACTS [16 USC 668 et. seq.]			
BALD AND GOLDEN EAGLES		A/L	
• Prohibited Acts; Criminal Penalties	16 USC 668(a)		
• Civil Penalties	16 USC 668(b)		
• Cancellation of Grazing Agreements	16 USC 668(c)		
• Taking and Using of the Bald and Golden Eagle for Scientific, Exhibition, and Religious Purposes	16 USC 668(a)		
• Enforcement Provisions	16 USC 668(b)		

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Requirement	Citation	Type	Comment
COLORADO NONGAME, ENDANGERED, OR THREATENED SPECIES CONSERVATION ACT [CRS 33-1-115, 33-2-101 to 33-2-107]			
<ul style="list-style-type: none"> • Willful Destruction of Wildlife • Damage or Destruction of Dens or Nests - Harassment of Wildlife 	CRS 33-6-117 CRS 33-6-128	A/L	
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
COLORADO NONGAME WILDLIFE <ul style="list-style-type: none"> • Protected Species • Endangered Wildlife - Designation of Species • Threatened Wildlife - Designation of Species • Nongame Wildlife - Designation of Species 	2 CCR 406-8 Article I, #1000 Article II, #1002 Article III, #1003 Article IV, #1004	A/L	
FISH AND WILDLIFE COORDINATION ACT [16 USC 661 et seq.]			
<ul style="list-style-type: none"> • Purpose • Impounding, Diverting, or Controlling of Waters • Impoundment or Diversion of Waters • Rules and Regulations • Effects of Sewage and Industrial Waters • Authorization of Appropriations • Penalties • Definitions 	16 USC 661 16 USC 662 16 USC 663 16 USC 664 16 USC 665 16 USC 666 16 USC 666(a) 16 USC 666(b)	A/L	

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Requirement	Citation	Type	Comment
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
NATIONAL HISTORIC PRESERVATION ACT (NHPA) [16 USC 470 et. seq.]			
IDENTIFYING HISTORIC PROPERTIES <ul style="list-style-type: none"> • Assessing Information Needs • Locating Historic Properties • Evaluating Historical Significance • When No Historic Properties Are Found • Historic Property Found 	36 CFR 800.4	L	
ASSESSING EFFECTS OF THE ACTIVITY ON THE PROPERTY	36 CFR 800.5	L	
DOCUMENTATION REQUIREMENTS	36 CFR 800.8	L	
CRITERIA OF EFFECT AND ADVERSE EFFECT	36 CFR 800.9	L	
PROTECTING NATIONAL HISTORIC LANDMARKS	36 CFR 800.10	L	
HISTORIC PROPERTIES DISCOVERED DURING IMPLEMENTATION	36 CFR 800.11	L	
EMERGENCY UNDERTAKINGS	36 CFR 800.12	L	
PRESERVATION OF AMERICAN ANTIQUITIES	43 CFR 3	L	
PROTECTION OF ARCHEOLOGICAL RESOURCES	43 CFR 7	L	

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NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
ARCHEOLOGICAL RESOURCES PROTECTION [16 USC 470, Chapter 1B]			
PROTECTION OF ARCHEOLOGICAL RESOURCES: UNIFORM REGULATIONS	36 CFR 296	L	
• Purpose	.1		
• Authority	.2		
• Definitions	.3		
• Prohibited Acts	.4		
• Permit Requirements and Exceptions	.5		
• Application for Permits and Information Collection	.6		
• Notification to Indian Tribes of Possible Harm to, or Destruction of, Sites on Public Lands Having Religious or Cultural Importance	.7 .12		
• Relationship to Section 106 of the National Historic Preservation Act	.13		
• Custody of Archeological Resources	.14		
• Determination of Archeological or Commercial Value and Cost of Restoration and Repair	.15		
• Assessment of Civil Penalties	.16		
• Civil Penalty Amounts	.17		
• Other Penalties and Rewards	.18		
• Confidentiality of Archeological Resource Information	.19		
• Report	36 CFR 296		

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Requirement	Citation	Type	Comment
NATURAL RESOURCE AND WILDLIFE PROTECTION LAWS			
ARCHEOLOGICAL AND HISTORICAL PRESEVATION ACT (AHPA) [16 USC 469a-1]			
Notification and Request for Preservation of Data Survey of Sites; Preservation of Data; Compensation	16 USC 469a-1(a) 16 USC 469a-1(b)	L	Differs from NHPA in that it encompasses a broader scope of resources than those listed on the National Register and requires only preservation of the data (including analysis and publication).
SAFE DRINKING WATER ACT (SDWA) [42 USC 300f et. seq.]			
COLORADO PRIMARY DRINKING WATER REGULATIONS <ul style="list-style-type: none"> • MCL for Microbiological Contaminants • MCL for Turbidity • MCLs for Inorganic Chemicals • MCLs for Organic Chemicals <ul style="list-style-type: none"> - MCL for Volatile Organic Chemicals (VOCs) - MCL for Total Trihalomethanes (TTHMs) - MCLs for Synthetic Organic Chemicals (SOCs) • MCLs for Radioactivity <ul style="list-style-type: none"> - MCLs for Radium-226, Radium-228, and Gross Alpha Particle Activity in Community Water Systems - MCLs for Beta Particle and Photon Radioactivity From Man-Made Radionuclides in Community Water Systems 	5 CCR 1003-1, [40 CFR 141] 3.1.2 4.1.1 5.2.1 5.2.2 5.2.4 5.2.3 6.1.1 6.1.2	C	These regulations may be relevant and appropriate to surface water and groundwater under their current use classifications.
MAXIMUM CONTAMINANT LEVEL GOALS <ul style="list-style-type: none"> • MCLGs for Organic Contaminants • MCLGs for Inorganic Contaminants 	40 CFR 141 .50 .51 .52	C	Non-zero MCLGs would also be relevant and appropriate to surface water and groundwater possessing drinking water supply use classifications. MCLGs equal to zero establish unattainable goals and are therefore not ARARs according to the NCP.

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Requirement	Citation	Type	Comment
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SAFE DRINKING WATER ACT (SDWA) [42 USC 300f et. seq.]

- MCLGs for Microbiological Contaminants

SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.]

SUBTITLE C: HAZARDOUS WASTE MANAGEMENTC [Colorado Hazardous Waste Act (CRS § § 25-15-101 to -217)]

The State of Colorado is authorized to administer portions of the hazardous waste management program (e.g., RCRA) to regulate the generation, treatment, storage, and disposal of hazardous waste within Colorado. As such, the Colorado regulations that are more stringent than the federal counterparts would be applicable to the management of hazardous waste. These regulations may also be relevant and appropriate in situations where a remediation waste is "sufficiently similar" to a RCRA-listed waste (e.g., waste which was generated and disposed of prior to the effective date of regulation) or when the proposed remedial action is similar to a RCRA-regulated activity and would be appropriate to ensure that the activity is protective of human health and the environment. Although the Colorado hazardous waste management regulations are similar to the federal requirements, both the federal and state regulatory citations are provided for reference purposes and to denote that both federal and state requirements were considered in establishing the identifying the ARAR requirement adopted for the remediation of the RFETS. Only substantive portions of the regulations are required under CERCLA actions for onsite activities. The State has not verified that these are the only substantive standards. The final determination is predicated upon an analysis for a specific action.

SITING OF HAZARDOUS WASTE DISPOSAL SITES <ul style="list-style-type: none"> • Minimum Design Performance Criteria for Off-Site Hazardous Waste Disposal Sites and On-Site Hazardous Waste Landfills • Requirements for Siting and Design of Off-Site Hazardous Waste Disposal Sites and On-Site Hazardous Waste Landfills 	6 CCR 1007-2 Part 2.4 Part 2.5	L	
IDENTIFICATION AND LISTING OF HAZARDOUS WASTES	6 CCR 1007-3, 261 [40 CFR 261]	A	

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Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENTC [Colorado Hazardous Waste Act (CRS § § 25-15-101 to -217)]			
GENERATOR STANDARDS <ul style="list-style-type: none"> • Hazardous Waste Determinations • Record Keeping and Reporting Requirements <ul style="list-style-type: none"> - Record Keeping and Reporting 	6 CCR 1007-3, 262 [40 CFR 262] .11 .40 to .43	A	Persons who generate solid wastes are required to determine if the waste is hazardous. The definition and procedures contained in 6 CCR 1007-3, 261 [40 CFR 261] are to be followed to make this determination.

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SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENTC [Colorado Hazardous Waste Act (CRS § § 25-15-101 to -217)]			
GENERAL FACILITY STANDARDS	6 CCR 1007-3,264 Subpart B [40 CFR 264 Subpart B]		
• Waste Analysis	.13	A/L	
• Security	.14	A/L	Existing security measurements will be used and, where necessary, upgraded to prevent unknowing access to hazardous wastes.
• General Inspection Requirements	.15	A/L	Inspections will be conducted as a standard of control to prevent release of hazardous waste constituents to the environment or a threat to human health. Corrective actions will be taken resolve deficiencies.
• Personnel Training	.16	C/A	Personnel will be properly trained to prevent mismanagement of hazardous waste and/or regulatory violations.
• General Requirements For Ignitable, Reactive, or Incompatible Wastes	.17	C/A	Procedures will be implemented to prevent accidental ignition or reaction of ignitable or reactive waste, or the mixing of incompatible waste.
• Construction Quality Assurance Program	.19	C/A	A construction QA program will be implemented for the construction of any new hazardous waste disposal site.
Installation Standards	.18		
• Seismic Considerations		A/L	Hazardous waste management facilities will not be located within a 100-year floodplain.
• Installation Standards			

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SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENTC [Colorado Hazardous Waste Act (CRS § § 25-15-101 to -217)]			
PREPAREDNESS AND PREVENTION <ul style="list-style-type: none"> • Design and Operation of Facility • Required Equipment • Testing and Maintenance of Equipment • Access to Communications or Alarm System • Required Aisle Space • Arrangements with local Authorities 	6 CCR 1007-3, 264, Subpart C [40 CFR 264, Subpart C] .31 .32 .33 .34 .35 .37	A/L	Hazardous waste facilities will be designed to minimize the potential for incidents. Equipment will be provided to respond to credible incidents and arrangements with emergency response units will be executed.
CONTINGENCY PLAN AND EMERGENCY PROCEDURES <ul style="list-style-type: none"> • Purpose and Implementation • Content of Plan • Emergency Coordinator • Emergency procedures 	6 CCR 1007-3, 264, Subpart D [40 CFR 264 Subpart D] .51 .52 .55 .56	A	The existing RFETS contingency plan will be reviewed and revised accordingly to ensure that the procedures are adequate to respond to any new conditions posed by the remedial actions and/or the operation of new hazardous waste management facilities.

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SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENTC [Colorado Hazardous Waste Act (CRS § § 25-15-101 to -217)]			
GROUNDWATER PROTECTION (continued) <ul style="list-style-type: none"> • Compliance Period 	.96	A	<p>For any hazardous waste remaining onsite following the completion of closure activities, groundwater monitoring will be performed to demonstrate protectiveness of the selected remedial actions. The compliance period is defined as equal to the actual life of the waste management unit as determined by the State in the facility permit. For monitoring that is being conducted as part of a RCRA corrective action, compliance period is extended until it can demonstrate that the ground-water protection standard has not been exceeded for a period of three consecutive years. The five-year review provisions of CERCLA Section 121c (see 40 CFR 300.430(f)(4)(ii)) will be considered in establishing the compliance period.</p>
<ul style="list-style-type: none"> • General Ground-Water Monitoring Requirements <ul style="list-style-type: none"> - Number of Wells - Casing - Sampling and Analysis Procedures - Statistical Methods Utilized 	.97		<p>Any additional monitoring wells that are installed as a result of remedial activities for the monitoring of hazardous waste management sites will conform to existing approved RCRA groundwater monitoring program.</p>

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SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENTC [Colorado Hazardous Waste Act (CRS § § 25-15-101 to -217)]			
GROUNDWATER PROTECTION (continued)			
<ul style="list-style-type: none"> • Detection Monitoring Program <ul style="list-style-type: none"> - Parameters or Constituents - System and Procedures - Statistical Exceedences 	.98	A	
<ul style="list-style-type: none"> • Compliance Monitoring Program <ul style="list-style-type: none"> - Monitoring - Installation of System - Sampling Procedures and Statistical Methods - Evidence of Increased Contamination - Flow Rates 	.99		
<ul style="list-style-type: none"> • Corrective Action Program <ul style="list-style-type: none"> - Compliance with Groundwater Protection Standard - Prevent Hazardous Constituents from Exceeding Concentration Limits - Time Frame - Groundwater Monitoring - Corrective Action Measures 	.100		

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Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENTC [Colorado Hazardous Waste Act (CRS § § 25-15-101 to -217)]			
CLOSURE AND POST-CLOSURE <ul style="list-style-type: none"> • Closure Performance Standards • Disposal or Decontamination of Equipment, Structures and Soils • Maintenance, Monitoring, Security, and Care • Post-Closure Use of Property 	6 CCR 1007-3, 264, Subpart G [40 CFR 264, Subpart G] .111 .114 .117 .117	A	
USE AND MANAGEMENT OF CONTAINERS <ul style="list-style-type: none"> • Condition of Containers • Compatibility of Waste with Containers • Management of Containers • Inspections • Containment <ul style="list-style-type: none"> - Containment System Design and Operation - Containment for Ignitable or Reactive Wastes - Containment for Incompatible Wastes • Closure 		A	

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Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENTC [Colorado Hazardous Waste Act (CRS § § 25-15-101 to -217)]			
TANK SYSTEMS <ul style="list-style-type: none"> • Design and Installation of New tank Systems or Components • Containment and Detection of Releases <ul style="list-style-type: none"> - Secondary Containment - Design and Construction - Secondary Containment Devices • General Operating Requirements • Inspections • Response to Leaks or Spills and Disposition of Leaking or Unfit-for-Use Tank Systems • Closure and Post-Closure Care • Special Requirements for Ignitable or Reactive Wastes • Special Requirements for Incompatible Wastes 	6 CCR 1007-3, 264, Subpart J or, 6 CCR 1007.3, 265, Subpart J, as appropriate [40 CFR 264, Subpart J, or 40 CFR 265, Subpart J, as appropriate] .192 .193 .194 .195 .196 .197 .198 .199	A	Either existing or new tank systems will be used to treat or store hazardous waste generated as a result of remedial activities. Existing tank systems will only be used if it is determined that the tank system is adequate and has sufficient integrity to prevent failure of the tank system during the proposed new use. Existing tank systems will be closed in accordance with approved closure plans or IM/IRA documents.

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Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENTC [Colorado Hazardous Waste Act (CRS § § 25-15-101 to -217)]			
SURFACE IMPOUNDMENTS <ul style="list-style-type: none"> Monitoring and Inspection Closure and Post-Closure Care 	6 CCR 1007-3, 264, Subpart K, or, 6 CCR 1007-3, 265, Subpart K, as appropriate [40 CFR 264, Subpart K, or, 40 CFR 265, Subpart K, as appropriate] .226 .228	A	All existing hazardous waste surface impoundments (e.g., Solar Evaporation Ponds) have been removed from service and are currently being closed. The closure, post-closure, and construction inspection requirements are included as part of the OU4 IM/IRA. In the event surface impoundments units are identified as part of a potential remedy Subpart K may become an ARAR.
WASTE PILES	6 CCR 1007-3, 264, Subpart L [40 CFR 264, Subpart L]	A	In the event waste piles are identified as part of a potential remedy, Subpart L may become ARAR
LAND TREATMENT	6 CCR 1007-3, 264, Subpart M [40 CFR 264 Subpart M]	A	In the event land treatment units are identified as part of a potential remedy, Subpart M may become ARAR.
LANDFILLS	6 CCR 1007-3, 264, Subpart N, or 6 CCR 1007-3, 265, Subpart N, as appropriate	A	In the event land treatment units are identified as part of a potential remedy, Subpart N may become ARAR.

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LANDFILLS (continued)	[40 CFR 264 Subpart N, or, 40 CFR 265, Subpart N, as appropriate]		
INCINERATORS <ul style="list-style-type: none"> • Waste Analysis • Principal Organic Hazardous Constituents • Performance Standards • Operating Requirements • Monitoring and Inspections • Closure 	6 CCR 1007-3, 264, Subpart O [40 CFR 264, Subpart O] .341 .342 .343 .345 .347 .351	A	These regulations are ARARs for the closure and/or the design, construction, and operation of a new incinerator system.
CORRECTIVE ACTION FOR SOLID WASTE MANAGEMENT UNITS <ul style="list-style-type: none"> • Corrective Action Management Units <ul style="list-style-type: none"> - Standards for Designating a CAMU - Requirements for Groundwater Monitoring - Closure Requirements for CAMUs • Temporary Units <ul style="list-style-type: none"> - Requirements for TUs - Factors for Establishing Standards for Tus 	6 CCR 1007-3, 264, Subpart S [40 CFR 264, Subpart S] .552 .553	A	Colorado has adopted a CAMU/TU rule. The provisions for designating CAMUs and TUs will be followed to facilitate implementation of a corrective action.

A - Action-Specific ARAR; C - Chemical-Specific ARAR; L - Location-Specific ARAR; TBC - To Be Considered; TBD-To Be Determined

Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENTC [Colorado Hazardous Waste Act (CRS § § 25-15-101 to -217)]			
SOIL REMEDIATION POLICY DOCUMENT		TBC	
<ul style="list-style-type: none"> Colorado Soil Remediation Objectives Policy Document 	December, 1997		Cost effective, site-specific risk-based approach to establishing soil remediation objectives. Would be considered in manner compatible with ALF and RFCA Attachment 10.
MISCELLANEOUS UNITS	6 CCR 1007-3, 264, Subpart X [40 CFR 264, Subpart X]	A	These standards are being listed as ARARs in the event that a miscellaneous unit is selected for the treatment of hazardous waste pursuant to the CMS/FS process.
<ul style="list-style-type: none"> Environmental Performance Standards <ul style="list-style-type: none"> Groundwater and Subsurface Protection Surface Water, Wetland and Surface Soil Protection Air Protection Monitoring, Analysis, Inspection, Response, Reporting, and Corrective Action Post-Closure Care 	.601 .602 .603		

A - Action-Specific ARAR; C - Chemical-Specific ARAR; L - Location-Specific ARAR; TBC - To Be Considered; TBD-To Be Determined

Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENTC [Colorado Hazardous Waste Act (CRS § § 25-15-101 to -217)]			
AIR EMISSION STANDARDS FOR PROCESS VENTS <ul style="list-style-type: none"> Standards: Process Vents Standards: Closed-Vent Systems and Control Devices Test Methods and Procedures Record Keeping Requirements Reporting Requirements 	6 CCR 1007-3, 264, Subpart AA [40 CFR 264 Subpart AA] .1032 .1033 .1034 .1035 .1036	A	These standards will be incorporated into the design of process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping operations that manage hazardous wastes with organic concentrations of at least 10-ppm (by weight).
AIR EMISSION STANDARDS FOR EQUIPMENT LEAKS <ul style="list-style-type: none"> Standards: Pumps in Light Liquid Service Standards: Compressors Standards: Pressure Relief Devices in Gas/Vapor Service Standards: Sampling Connecting Systems Standards: Open-Ended Valves or Lines Standards: Valves in Gas/Vapor or Light Liquid Service Standards: Pumps and Valves in Heavy Liquid Service, Pressure Relief Devices in Light or Heavy Liquid Service, Flanges, and Other Connectors Standards: Closed-Vent Systems and Control Devices 	6 CCR 1007-3, 264, Subpart BB [40 CFR 264, Subpart BB] .1052 .1053 .1054 .1055 .1056 .1057 .1058 .1060	A	These standards will be incorporated into the design of remediation equipment that contains or contacts hazardous wastes with organic concentrations of at least 10 percent by weight excluding equipment that is in vacuum service.

A - Action-Specific ARAR; C - Chemical-Specific ARAR; L - Location-Specific ARAR; TBC - To Be Considered; TBD-To Be Determined

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Final RFCA: IGD
Appendix 3
July 20, 1998

Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENTC [Colorado Hazardous Waste Act (CRS § § 25-15-101 to -217)]			
<ul style="list-style-type: none"> • Alternative Standards for Valves in Gas/Vapor Service or in Light Liquid Service: Percentage of Valves Allowed to Leak • Alternative Standards for Valves in Gas/Vapor Service or in Light Liquid Service: Skip Period Leak Detection and Repair • Test Methods and Procedures • Record Keeping Requirements • Reporting Requirements 	.1061 .1062 .1063 .1064 .1065		
CONTAINMENT BUILDINGS <ul style="list-style-type: none"> • Design and Operating Standards • Closure and Post-Closure Care 	6 CCR 1007-3, 264, Subpart DD [40 CFR 264 Subpart DD] .1101 .1102	A	These standards will be incorporated into the design of a containment building that is built to facilitate the management of hazardous remediation waste.
Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities	6 CCR 1007-3.267 [40 CFR 266]	A	Waste management plans will be developed to ensure compliance with the specific classes of hazardous waste (e.g., Recyclable Materials Used In a Manner Constituting Disposal, Burning for Energy Recovery, Recyclable Materials Utilized for Precious Metal Recovery, and Spent Lead-Acid Batteries Being Reclaimed) identified in this regulation.

A - Action-Specific ARAR; C - Chemical-Specific ARAR; L - Location-Specific ARAR; TBC - To Be Considered; TBD-To Be Determined

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Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE C: HAZARDOUS WASTE MANAGEMENTC [Colorado Hazardous Waste Act (CRS § § 25-15-101 to -217)]			
LAND DISPOSAL TREATMENT STANDARDS <ul style="list-style-type: none"> • General • Prohibitions on Land Disposal • LDR Treatment Standards <ul style="list-style-type: none"> - Treatment Standards for Hazardous Wastes - Treatment Standards Expressed as Specified Technologies - Variance from Treatment Standard - Treatment Standards for Hazardous Debris - Universal Treatment Standards • Prohibition on Storage of Restricted Waste 	<p>6 CCR 1007-3, 268 [40 CFR 268]</p> <p>6CCR 1007-3, 268 Subpart A [40CFR268, SubpartA]</p> <p>6 CFR 10007-3, 268, Subpart C [40CFR 268, Subpart C]</p> <p>6 CFR 10007-3, 268, Subpart D [40 CFR 268, Subpart D]</p> <p>6 CCR 1007-3, 268 Subpart E [40 CFR 268, Subpart E]</p>	A	<p>Waste management plans will be developed to ensure compliance with the Land Disposal Restrictions. The performance requirements for hazardous waste treatment systems will be based on the LDR Treatment Standards contained in Subpart C.</p> <p>Applicability of LDRs will be addressed in decision document – mixed waste may be treated using treatment capacity developed in the mixed waste Site Treatment Plan.</p>

A - Action-Specific ARAR; C - Chemical-Specific ARAR; L - Location-Specific ARAR; TBC - To Be Considered; TBD-To Be Determined

Requirement	Citation	Type	Comment
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SOLID WASTE DISPOSAL ACT (AKA: RESOURCE CONSERVATION AND RECOVERY ACT) [42 USC § 6901 et. seq.]
SUBTITLE D: STATE OR REGIONAL SOLID WASTE PLANS COLORADO SOLID WASTE SITES AND FACILITIES [6 CCR 1007-2, PART 1]

CLOSURE AND POST-CLOSURE <ul style="list-style-type: none"> • Minimum Standards <ul style="list-style-type: none"> - Closure of Solid Waste Disposal Sites and Facilities - Post-Closure Care and Maintenance Standards • Standards for Solid Waste Disposal Landfill Sites and Facilities <ul style="list-style-type: none"> - Closure - Post-Closure Care and Maintenance 	<p>6 CCR 1007-2, Part 1, Section 2.5.1 to 2.5.9 [40 CFR 258.60 (a)-(h)]</p> <p>6 CCR 1007-2, Part 1, Section 2.6.1 to 2.6.2 [40 CFR 258.61 (a)-(e)]</p> <p>6 CCR 1007-2, Part 1, Section 3.5.1 to 3.5.8 [40 CFR 258.60 (a)-(h)]</p> <p>6 CCR 1007-2, Part 1, Section 3.6.1 to 3.6.3 [40 CFR 258.61 (a)-(e)]</p>	<p>A</p>	<p>These regulations have been identified as potential ARARs with respect to closure of solid waste disposal sites.</p>
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A - Action-Specific ARAR; C - Chemical-Specific ARAR; L - Location-Specific ARAR; TBC - To Be Considered; TBD-To Be Determined

Requirement	Citation	Type	Comment
SOLID WASTE DISPOSAL ACT (aka: Resource Conservation and Recovery Act) [42 USC § 6901 et. seq.] SUBTITLE I: REGULATION OF UNDERGROUND STORAGE TANKS [CRS §§ 8-20-501 to -608; CRS §§ 25-18-101 to -109]			
UNDERGROUND STORAGE TANK REQUIREMENTS	7 CCR 1101-14	A	
TOXIC SUBSTANCES CONTROL ACT (TSCA) [15 USC 2601 et seq.]			
LABELING OF PCBs AND PCB ITEMS	40 CFR 761.40 and .45	A	
DISPOSAL REQUIREMENTS <ul style="list-style-type: none"> Disposal Requirements PCB Remediation Waste Disposal of PCB bulk product waste 	40 CFR 761.50 40 CFR 761.60 40 CFR 761.61 40 CFR 761.62	A	Waste management plans will be developed to ensure compliance with the specific requirements for PCB waste identified in this regulation.
STORAGE REQUIREMENTS FOR PCBs <ul style="list-style-type: none"> Time Limits Facility Criteria Temporary Storage Inspections Container Specifications Marking Laboratory Sample Exemption From Manifesting 	40 CFR 761.65	A	

A - Action-Specific ARAR; C - Chemical-Specific ARAR; L - Location-Specific ARAR; TBC - To Be Considered; TBD-To Be Determined

Requirement	Citation	Type	Comment
TOXIC SUBSTANCES CONTROL ACT (TSCA) [15 USC 2601 et seq.]			
INCINERATION <ul style="list-style-type: none"> • Liquid PCBs <ul style="list-style-type: none"> - Operating Requirements • Nonliquid PCBs 	40 CFR 761.70	A	These regulations would only be ARARs for the construction and operation of an onsite PCB incinerator; it is envisioned that this will not occur.
CHEMICAL WASTE LANDFILLS <ul style="list-style-type: none"> • Technical Requirements <ul style="list-style-type: none"> - Soils - Synthetic Membrane Liners - Hydrologic Conditions - Flood Protection - Topography - Monitoring Systems - Leachate Collection 	40 CFR 761.75	A	These regulations would only be ARARs for the construction and operation of an onsite PCB disposal cell; it is envisioned that this will not occur.
DECONTAMINATION STANDARDS AND PROCEDURES <ul style="list-style-type: none"> • Decontamination standards • Self-implementing decontamination procedures • Decontamination solvents • Limitation of exposure and control of releases • Sampling and recordkeeping • Decontamination waste and residues 	40 CFR 761.79	A	

A - Action-Specific ARAR; C - Chemical-Specific ARAR; L - Location-Specific ARAR; TBC - To Be Considered; TBD-To Be Determined

Requirement	Citation	Type	Comment
TOXIC SUBSTANCES CONTROL ACT (TSCA) [15 USC 2601 et seq.]			
Sampling <ul style="list-style-type: none"> Cleanup Site Characterization sampling for PCB remediation waste in accordance with § 761.61 (a)(z) Sampling to verify completion of self-implementing cleanup and on-site disposal of bulk PCB remediation waste and porous surfaces in accordance with § 761.61 (a)(b) Sampling non-porous surfaces for measurement based use, reuse, and on-site or off-site disposal under § 761.61 (a)(6) and determination under § 761.79 (6)(3) 	40 CFR 761.260 [Subpart N] 40 CFR 761.280 [Subpart O] 40 CFR 761.300 [Subpart P]		
PCB SPILL CLEANUP <ul style="list-style-type: none"> Requirements for PCB Spill Cleanup <ul style="list-style-type: none"> Disposal of Cleanup Debris and Materials Determination of Spill Boundaries Spills of <500 ppm PCBs, Involve <1 lb of PCBs by wt. Spills of \$500 ppm PCBs, Involve \$1 lb of PCBs by wt. Time Limits and Actions Within the First 24 Hours Requirements for Decontaminating Spills in Outdoor Electrical Substations Requirements for Decontaminating Spills in Restricted Access Areas Sampling Requirements 	40 CFR 761 .125 .130	TBC	40 CFR 761 Subpart G is entitled PCB Spill Cleanup Policy and thus many of the sections in Subpart G, specifically for spills after May 4, 1987, are "to be considered" (TBC).

A - Action-Specific ARAR; C - Chemical-Specific ARAR; L - Location-Specific ARAR; TBC - To Be Considered; TBD-To Be Determined

Appendix K

SUMMARY RISK ASSESSMENT METHODOLOGY FOR RFETS

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APPENDIX K

SUMMARY OF RISK ASSESSMENT METHODOLOGY FOR RFETS

1.0 HUMAN HEALTH RISK ASSESSMENT METHODOLOGY

A site-specific HHRAM was developed that differs from standard CERCLA guidance in some respects. The methodology has been documented in the *draft Human Health Risk Assessment Methodology for RFETS* (DOE, 1995b). The risk assessment methodology also includes the conservative screen, developed by the CDPHE and agreed to by the DOE, to ensure that the requirements of the RCRA are met. Several risk assessments for former OUs have been produced using this methodology. In the future, it is likely that it will be used for screening level risk assessment and as the basis for the CRA.

The HHRAM process, including the conservative screen, is shown in Figure K-1. Each step in the HHRAM process is done in consultation with the agencies and documented by a technical memorandum. Step 1 is the evaluation of data to determine if sufficient data of appropriate quality are available to perform a risk assessment or screen. Step 2 is the selection of potential chemicals of concern (PCOCs). Site data for inorganics and radionuclides have been compared to background values, using a battery of statistical test designed by Gilbert (1992), and accepted for use at RFETS by the DOE and the agencies. If the analyte was indicated to be above background by any of the tests it was considered a PCOC. This is a time consuming, costly, and statistically unsound (increased probability of a Type I error) process. For future risk assessments the Gilbert methodology will be treated as a statistical toolbox. The most appropriate test will be selected from the Gilbert toolbox for each analyte (inorganics and radionuclides) that has a maximum concentration greater than the background mean plus two standard deviations (M2SD). The selection of the statistical test will be a balance of the data characteristics (e.g., number of nondetects, distribution of data) of the analyte. A description of the statistical tests and their use is given in Attachment 1. All detected organics are considered to be PCOCs.

The RFCA changed the emphasis for environmental remediation to investigation, evaluation, and remediation of IHSSs and AOCs, instead of an OU by OU basis. The PCOC selection process will likely be applied to a particular source or associated sources grouped as an AOC. Fewer samples may be available for statistical analysis due to the change in emphasis to source areas. It will be very important that a sufficient number of samples be available for application of the Gilbert toolbox. After the determination of PCOCs, the conservative screen is applied to the data and the baseline risk assessment may be started.

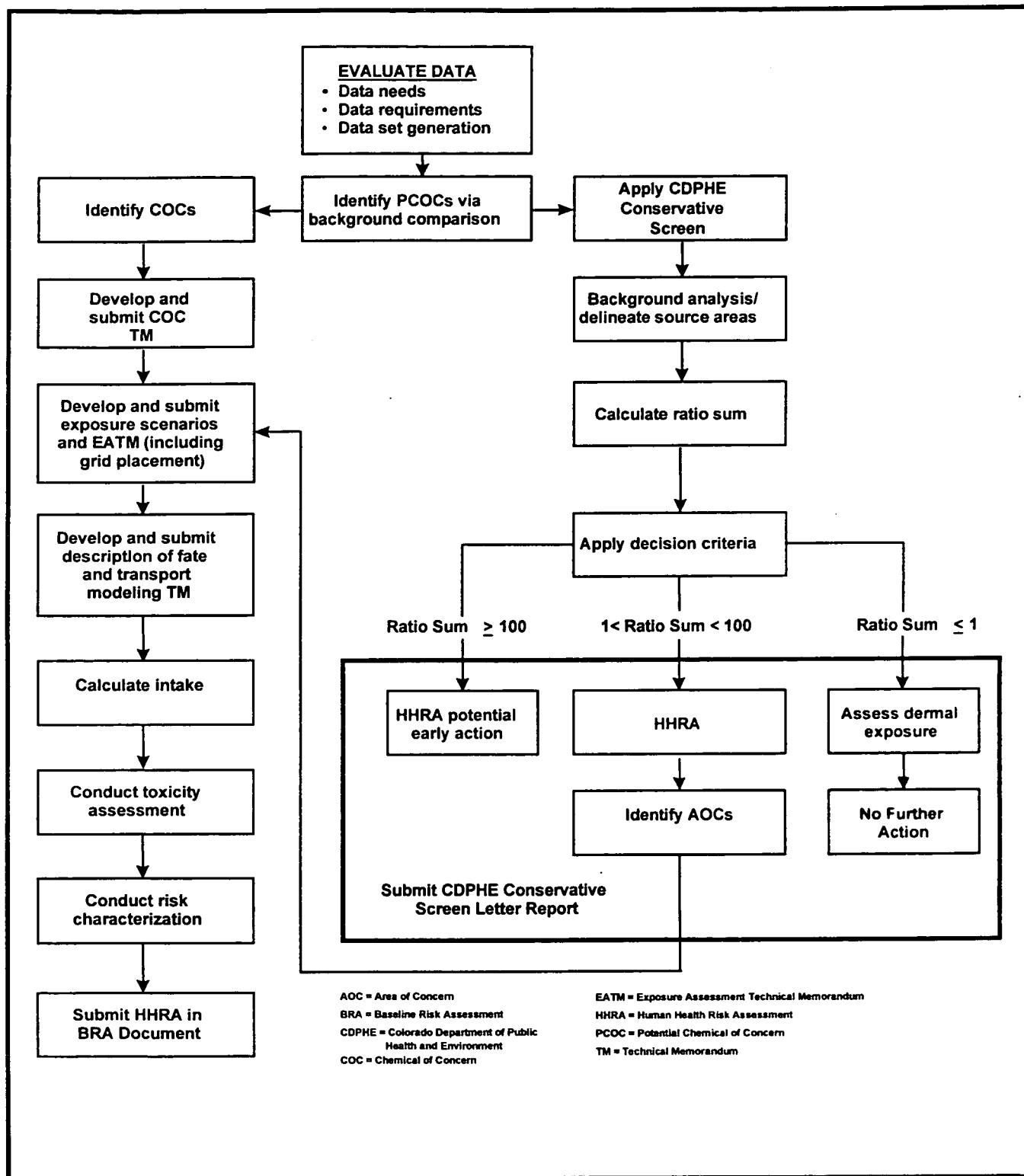


Figure K-1 Human Health Risk Assessment Methodology

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1.1 CONSERVATIVE SCREEN

The conservative screen has been accepted for use at the RFETS (DOE, 1994a). The purpose of the conservative screen is to help determine if a particular site is a candidate for no action, accelerated action, or further evaluation through the BRA process. The conservative screen is the basis of the NFA decision criteria presented in Attachment 6 of RFCA. A site that passes the conservative screen is a candidate for NFA status and free release with no land use restrictions.

The screen also provides methodologies for identifying source areas and grouping them into AOCs. The process is shown in Figure K-2. The conservative screen uses the residential PPRGs to calculate the ratios used in the decision criteria (DOE, 1995a). A letter report is submitted to the agencies to document the results.

1.2 CHEMICALS OF CONCERN

The next step in the HHRAM process is the selection of COCs. The selection process, as agreed to by the DOE and the agencies, is shown in Figure K-3.

The COCs have been selected on an OU-wide basis and then applied to each AOC within the OU. Now COC selection will often be done for single sources or sources grouped as an AOC as a result of an action level screen. It is very important that sufficient data be available for this analysis. The COC selection process for the CRA should be based on the present methodology, with COCs selected separately for the two site OUs (Buffer Zone and Industrial Area). The COCs are selected in consultation with the agencies and a TM is submitted to document the results.

1.3 EXPOSURE SCENARIOS AND PARAMETERS

Exposure scenarios and associated exposure factors, developed during negotiations among the DOE, the EPA, and the CDPHE, were transmitted to the agencies in June 1995 (DOE, 1995b). The exposure factors have been used in several BRAs for specific OUs (OUs 2, 3, 4, 5, and 6). The EPA and the CDPHE have accepted all of the exposure factors with the exception of the fraction ingested from contaminated source for the central tendency residential exposure by soil ingestion and the chemical-specific values for the soil ingestion matrix effect (EPA/CDPHE 1995). Chemical specific soil ingestion matrix values must be submitted to the agencies for approval before being used.

The two exposure scenarios to be used in the CRA to evaluate the on-Site risks and hazards to human health from environmental contamination under the RFCA will be the open-space recreational receptor for the BZ and the office worker for the IA. Off-Site risks and hazards will be evaluated using the residential scenario. Other scenarios may be evaluated in the CRA if agreed to by the DOE, EPA, and CDPHE.

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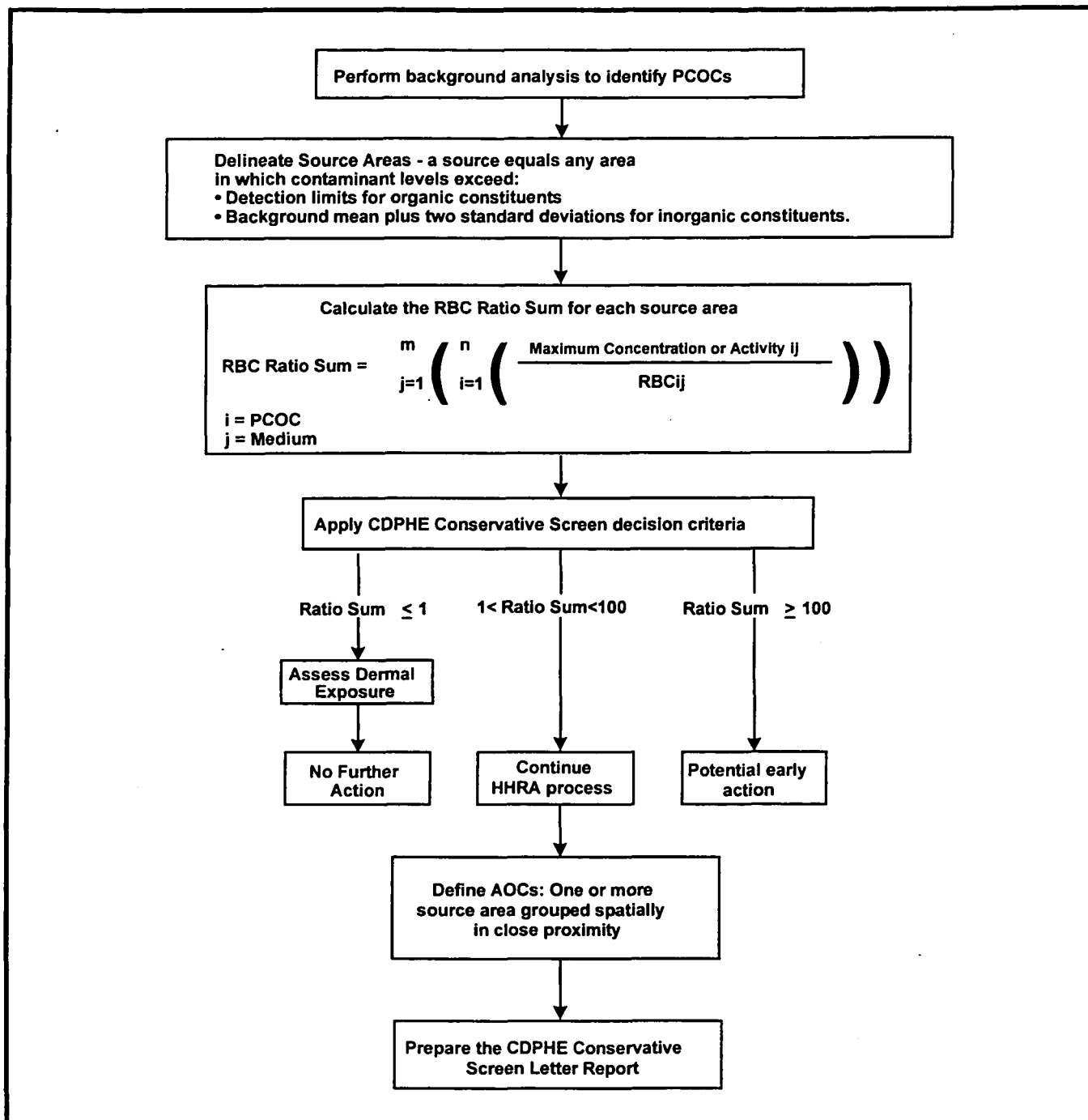


Figure K-2 CDPHE Conservative Screen

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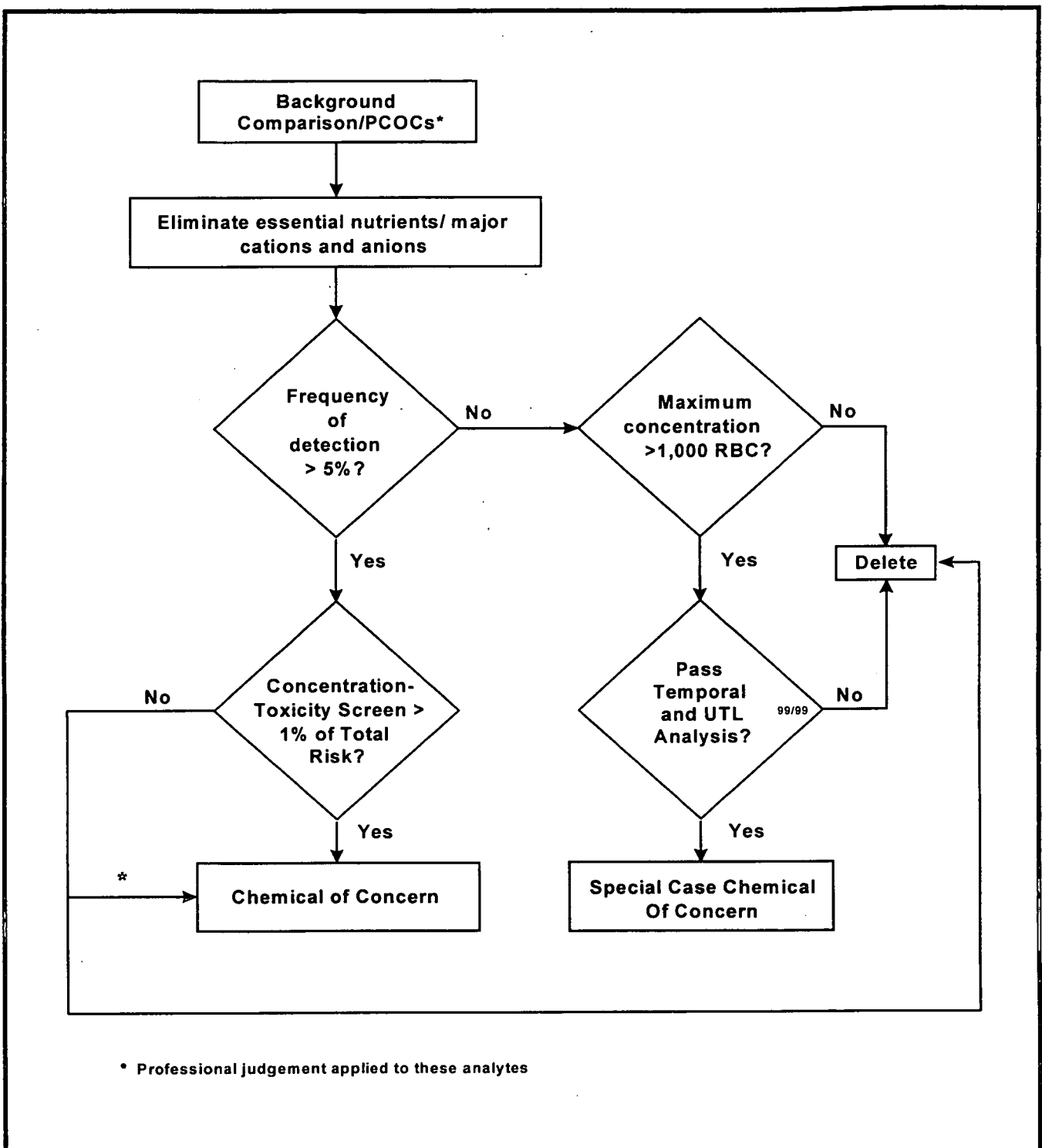


Figure K-3 Chemical of Concern Identification

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1.4 RISK CHARACTERIZATION

Exposure concentrations and risks will be calculated in accordance with EPA guidance (EPA, 1989a) as documented in the HHRAM (DOE, 1995b). Both radiological risk and dose will be estimated. Radiological doses will be calculated using methods and parameters employed for development of the ALF.

1.5 ECOLOGICAL RISK ASSESSMENT

Protection of ecological as well as human receptors is a central goal under CERCLA and the RFCA. The methodology for quantifying possible adverse effects to ecological receptors is similar to that for human receptors. A sitewide ERAM was developed that is consistent with the EPA's eight-step guidance (draft) on conducting ERAs at Superfund sites (EPA, 1994b). This methodology has been used for ecological risk assessments for the Walnut Creek and Woman Creek watersheds at RFETS (DOE, 1996c). The screening portion of this site-specific guidance is shown in Figure K-4 as described in the following documents:

- *ERAM Technical Memorandum, Sitewide Conceptual Model* (DOE, 1996a) helps identify environmental stressors and the potentially complete exposure pathways that will become the focus of the ERA.
- *ERAM Technical Memorandum, Ecological Chemicals of Concern Screening Methodology* (DOE, 1996b) describes a tiered screening process for identifying chemicals at potentially ecotoxic concentrations.

The purpose of a screening-level ERA is to detect whether a significant ecological threat exists in a geographic area. After PCOCs have been determined for a geographic area, risks are estimated by comparing maximum analyte concentrations with screening-level ecotoxicity benchmarks, with the subsequent generation of hazard quotient (HQ) values. The HQ is the result of the exposure estimate divided by the benchmark. This step is used to evaluate whether the preliminary screening is adequate to determine the presence of an ecological threat. If none of the PCOCs are present at ecotoxic concentrations, the site is considered to present a negligible or de minimis risk and a more detailed quantitative risk assessment is not warranted (EPA, 1994b). If a given IHSS or source area fails to pass the ERA screen ($HQ > 1$ for any analyte), the data are evaluated in more detail. This includes a much more comprehensive evaluation of exposure pathways and a more accurate method for estimating exposure than a screening-level ERA. The exposure estimation includes methods that account for factors which modify the frequency, duration, and intensity of contact between a receptor and the contaminated media. This evaluation results in a list of chemicals that are subjected to more detailed analysis in the ecological risk characterization.

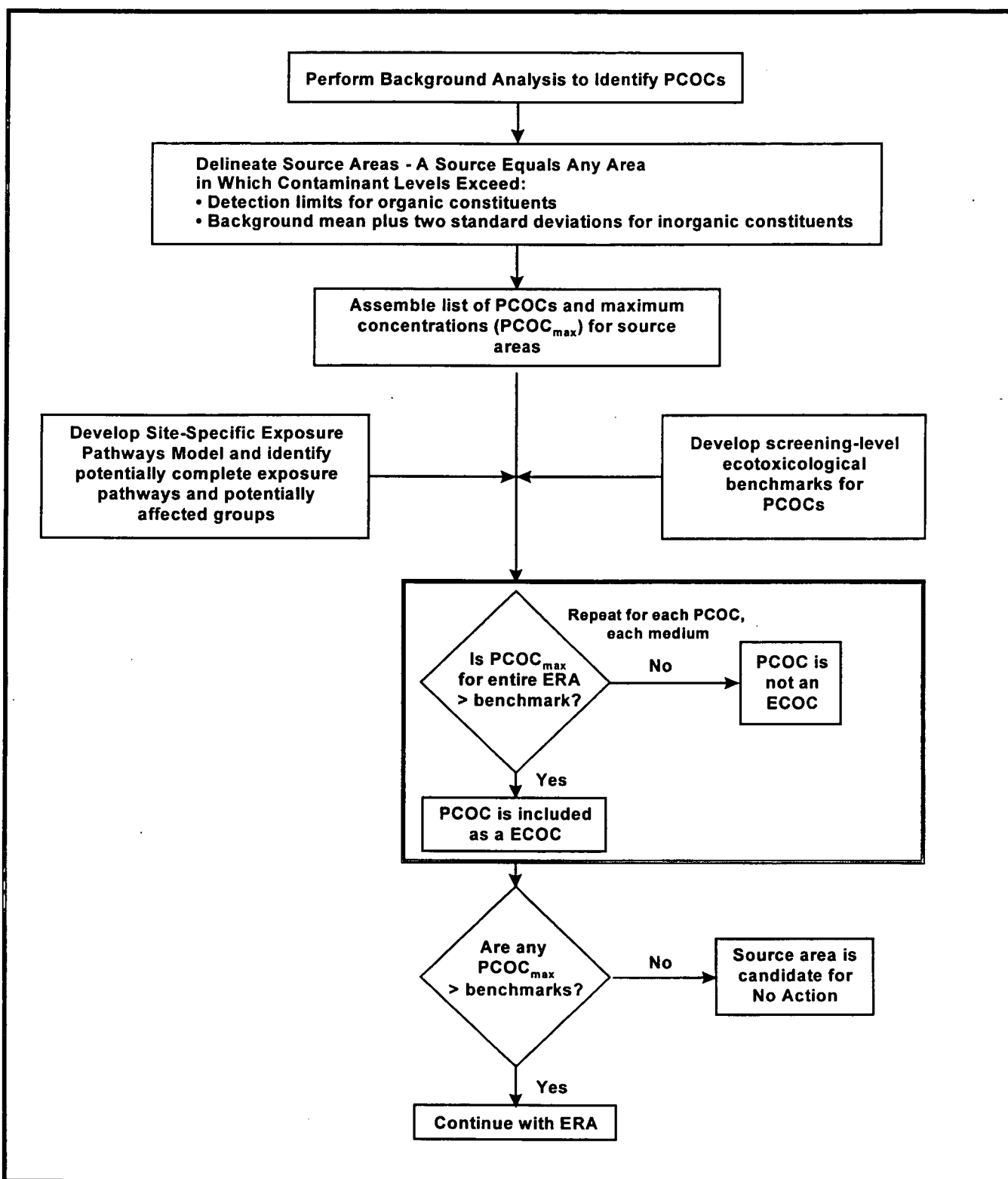


Figure K-4 Screening-Level ERA

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The characterization in the ERA integrates the exposure assessment and the effects assessment. It includes a description of risk in terms of the assessment endpoints, a discussion of the ecological significance of the effects, a summary of the overall confidence in the ERA, and a discussion of possible risk management strategies. The ERA performed for the Walnut Creek and Woman Creek watersheds will form the basis for the Ecological component of the CRA (DOE, 1996c).

ATTACHMENT 1

BACKGROUND COMPARISON (Adapted from Chromec et al., 1995)

Analytical results for metals, radionuclides, water-quality parameters, and selected organics, if appropriate, are compared to the chosen background data using one of the following five statistical tests.

Lognormal Upper Tolerance Level (UTL99/99) Each result is compared to the background 99% UTL on the 99th percentile of background. This hot measurement test assures that no hot spots in an area of concern are overlooked. If one or more measurements exceed the UTL99/99 the analyte is considered a PCOC pending application of professional judgment. UTLs cannot be reliably calculated for analytes with a very high rate (> 80%) of nondetects.

The Slippage Test This is a rapid screening test. The Slippage test is a nonparametric test and can be used for all data distributions. The test should not be used if the highest value in the data set is a nondetect. If the number of site measurements that exceed the background maximum value are greater than a critical number obtained from the appropriate table, then the analyte may be a PCOC.

The Quantile Test This is also a rapid screening, nonparametric test and can be used with all data distributions. If the number of site results that are among the largest r (number selected from a table of values) measurements exceeds a predetermined number, it may be concluded that the analyte is a PCOC. The test should only be used there are no nondetects among the largest measurements of the combined background and site data sets. A p -value of 0.05 or less is considered to indicate a significant difference from background concentrations.

The Gehan Test (nonparametric ANOVA) The Gehan test is a nonparametric test that can be used when multiple detection levels are present. It is applied without replacing nondetect values. The data are ordered, ranked and scored. A "Z" statistic is calculated and compared to values from a table at a chosen p -value. A p -value of 0.05 or less is considered to indicate a significant difference from background concentrations. Gilbert did not feel that the performance of this test had been sufficiently determined and suggested that it be evaluated at the earliest possible time.

The Student's t Test This is a common parametric test for determining if the means of two populations are different. The t test is the preferred test when the background and site data are normally and independently distributed, with equal variances and no nondetects. The test is applied on populations with at least 20 observations and less than 20% nondetects. A p-value of 0.05 or less indicates a significant difference between means.

Analytes with greater than 80% nondetects cannot be compared using statistical tests, and test results for analytes having 50-80% nondetects should be reviewed with caution.

If the selected statistical test indicates a statistical difference above background levels and it has been applied appropriately, the chemical will be considered a PCOC. Professional judgment will be also be used to retain or eliminate chemicals. Graphics may be used to support such decisions.

Professional Judgment Professional judgment is narrowly defined. It can be used to include a chemical that did not appear to be significantly different from background based on the results of the statistical test, but for which there exists a preponderance of historical data suggesting that the chemical may have been released to the environment in significant quantities. Professional judgment can also be applied to exclude a chemical for which at least one of the statistical tests was significant, but the difference from background can be explained by spatial, temporal, or pattern-recognition concepts.

Professional judgment may also determine that there was an invalid application of the statistical tests; distributional assumptions were violated or nondetect rates were so high that the statistical tests actually compared replacement values; making the test results highly suspect or meaningless. The statistical comparison of data sets where one or both data sets have high nondetect rates or high value nondetects may be an invalid use of the statistical tests (Gilbert and Simpson 1992). For RFETS, various reports (DOE 1993a, 1994; and others) have used 80 percent as the cut-off value for nondetects. However, there is inherent uncertainty in statistical test results that are produced using data sets with greater than 50 percent nondetects.

Other potential pitfalls in the application of statistical tests include violation of distributional assumptions, variance assumptions, data independence assumptions. If such assumptions are violated, the results of such statistical tests are suspect. If the results are accepted as valid, the PCOCs identified continue through the COC selection process.

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“Final Rocky Flats Cleanup Agreement”

Appendix L

ACTION LEVELS FOR RADIONUCLIDES IN SOILS

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APPENDIX L

Action Levels for Radionuclides in Soils

Appendix L, Action Levels for Radionuclides in Soils, provides the technical basis for the development of the enforceable action levels for radionuclides in soil as defined in Attachment 5 to the Rocky Flats Cleanup Agreement.

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“Final Rocky Flats Cleanup Agreement”

**ACTION LEVELS FOR RADIONUCLIDES IN SOILS
FOR THE
ROCKY FLATS CLEANUP AGREEMENT**

FINAL

**US DEPARTMENT OF ENERGY
US ENVIRONMENTAL PROTECTION AGENCY
COLORADO DEPARTMENT OF PUBLIC HEALTH AND THE ENVIRONMENT**

OCTOBER 31, 1996

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"Final Rocky Flats Cleanup Agreement"

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ACRONYMS

ALARA	As Low As Reasonably Achievable
ALF	Action Levels and Standards Framework for Surface Water, Ground Water and Soils
ANL	Argonne National Laboratory
CAB	Citizens Advisory Board
CDPHE	Colorado Department of Public Health and the Environment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
DCF	Dose Conversion Factor
DOE	US Department of Energy
EPA	US Environmental Protection Agency
GI	Gastrointestinal
ICRP	International Commission on Radiological Protection
MCL	Maximum Contaminant Level
NESHAPS	National Emission Standards for Hazardous Air Pollutants
NRC	US Nuclear Regulatory Commission
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RME	Reasonable Maximum Exposure
SCM	Site Conceptual Model

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“Final Rocky Flats Cleanup Agreement”

EXECUTIVE SUMMARY

INTRODUCTION

During the Rocky Flats Cleanup Agreement (RFCA) negotiations, the Action Levels and Standards Framework for Surface Water, Ground Water and Soils (ALF) Working Group realized that setting soil action levels and cleanup standards for radionuclides was a complex process and could not be completed before public notice of the draft RFCA. The RFCA Attachment 5 states that "The parties commit to expeditiously convene a working group to determine the derivation and application of the 15 mrem per year level as well as the derivation and potential application of the 75 mrem per year level." This summary explains the consensus recommendation of that Working Group.

The Working Group convened in early March 1996 and was composed of personnel from the Department of Energy (DOE), the Environmental Protection Agency (EPA), the Colorado Department of Public Health and Environment (CDPHE) and Kaiser-Hill, L.L.C. The Working Group agreed that its charter was to develop technically defensible standards which will not exceed the 15/75 mrem per year dose limits in ALF. The Working Group recognized that the 15/75 requirement was based on EPA's draft 40CFR196, Radiation Site Cleanup Regulations, which were intended for the release of government property. Because the RFCA preamble and the Rocky Flats Vision identify future land uses for the RFETS, which exclude release of government property and permit no residential land use, pertinent sections of the draft regulation were used as guidance for the Working Group.

Radiation dose was chosen as the primary criterion for assessing radionuclide action levels. The ALF called for the consideration of both radiation dose assessment and radiation risk assessment by the working group in making its recommendations. The use of radiation dose to develop action levels is consistent with EPA's draft 40CFR196, Nuclear Regulatory Commission decommissioning requirement, DOE Order 5400.5, "Radiation Protection of the Public and the Environment", and

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DOE's proposed 10CFR834. Since these regulations are all radiation dose based, this is compelling evidence that the radiation protection community is recommending the use of radiation dose to limit environmental levels of radionuclides. In addition, the preamble to draft 40CFR196 compares the risks associated with remediation, transportation and disposal of contaminated soils against the risks of leaving contaminated soils in place at the 15/75 mrem per year dose limit. EPA concluded that the use of a 15/75 mrem dose limit to establish action levels is protective of the public. Furthermore, the dose assessment process incorporates all pertinent facets of EPA's CERCLA risk assessment process. The radionuclide working group agrees with the EPA draft regulation and is recommending the use of a radiation dose basis.

To translate the radiation dose requirements into soil action levels, it is necessary to first model radionuclide transport within the environment to a human receptor and then assess the receptor's radiation dose. The "RESRAD" computer code was chosen to model this complex process. RESRAD was specifically developed to calculate the radiation dose to an individual and also to derive action levels for radionuclides in soil. RESRAD has been verified and validated for use in assessing radioactive material in soils. An asset of the RESRAD code is its capability to assess contaminant transport to a human receptor in air, surface water, ground water and unsaturated zone soils over the 1,000 year modeling period as specified in the draft EPA regulation. This makes it possible to calculate radiation dose and action levels over any applicable exposure routes (e.g., ingestion, inhalation and external irradiation pathways) for a given receptor. RESRAD also has the capability to model multiple exposure scenarios (e.g., residential, open space and office worker) and to assess radioactive daughter products over the 1,000 year modeling period. The radionuclide working group recommends the use of RESRAD in calculating action levels for the RFETS.

SITE CONCEPTUAL MODEL

There are two separate soil types that need to be assessed at the RFETS: surface soils and subsurface soils. Surface soils are defined in the ALF from the surface to a depth of 15 cm. Consistent with the

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RFCA preamble and the Rocky Flats Vision, ALF specifies that surface soil action levels would be derived using an open space exposure scenario in the buffer zone and an office worker exposure scenario in the industrial area. Subsurface soils are defined in the ALF from a depth of 15 cm to the top of the ground water table. Per the ALF, subsurface soil action levels are protective of surface water standards through ground water transport of contaminants to surface water. Ground water is not considered a potential drinking water source at RFETS as prescribed in the RFCA preamble and the Rocky Flats Vision.

Per the RFCA preamble and the Rocky Flats Vision, institutional controls may be applied at RFETS. Use of institutional controls may be considered under EPA's draft 40CFR196 when releasing a site. EPA's draft regulation states that any radioactive material in surface soils shall not impart an annual radiation dose to the appropriate human receptor (e.g. an open space receptor in the buffer zone or an office worker receptor in the industrial area) in excess of 15 millirem. Since radiation dose is being examined for a 1,000 year time period, the draft EPA regulation conservatively assumes that institutional controls fail in the future and that a hypothetical resident moves onto the site. Due to the long lived nature of radionuclides at Rocky Flats, the working group is recommending the assessment of a hypothetical future resident. This recommendation was a conscious decision by the working group despite the guidance in the vision which provides for no future residential uses. The annual radiation dose received by this hypothetical future resident will not exceed 85 millirem (Note: The annual radiation dose for this hypothetical individual in EPA's draft 40CFR196 recently changed from 75 mrem to 85 mrem).

There are two action levels that need to be calculated for surface soils. Tier I action levels are numeric levels that, when exceeded, trigger an evaluation, remedial action and/or management action, given the presence of institutional controls. Tier II action levels are numeric levels that, when met, do not require remedial action and/or institutional controls. The final action levels were derived by examining both the hypothetical future resident action levels and the action levels based on the most appropriate land use and then choosing the most conservative action level. The radionuclide working

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group recommends adopting the Tier I and Tier II methodology outlined in the "Action Levels and Standards Framework for Radionuclides in Surface Water, Groundwater and Soils (ALF)." Proposed modifications to ALF and a discussion of put-back levels can be found in the document entitled, "Modifications to the Action Levels and Standards Framework." Table ES-1, "Tier I & II Soil Action Levels," outlines the Tier I and Tier II action levels being recommended by the radionuclide working group. The working group is recommending that the hypothetical future resident exposure scenario at the 85 mrem level be the Tier I action level for surficial soils in the buffer zone. The working group is also recommending that the office worker exposure scenario at the 15 mrem level be the Tier I action level for surficial soils in the industrial area. Further, the working group is recommending that the Tier II action level be the hypothetical future resident exposure scenario at the 15 millirem level.

Per the ALF, subsurface soil action levels must be protective of surface water standards through the transport of contaminants in ground water. The ALF requires that subsurface soil action levels be based on the leaching of contaminants to ground water, such that the ground water levels are protective of surface water standards. This concept was discussed by the radionuclide working group and not recommended for use at RFETS. Since the subsurface soils at RFETS are highly heterogeneous, it is not currently possible to accurately model radionuclide transport in these subsurface soils. Therefore, the radionuclide working group currently recommends a conservative approach by applying the Tier I and Tier II surface soil action levels to the subsurface soils. In addition, subsurface soil leaching of radionuclides to ground water is currently being investigated at the RFETS. If an accurate subsurface soil leaching model can be developed for RFETS in the future, and is agreed upon by the RFCA parties, the current working group recommendations may need to be updated.

RESRAD INPUT PARAMETERS

In the RESRAD computer code, there are approximately seventy different inputs that were discussed and agreed upon by the radionuclide working group for each exposure scenario. Site-specific values

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were chosen for these inputs whenever possible so that the action levels could be tailored to RFETS. If a site-specific value was not available, the RESRAD default input was used. The RESRAD code was used to evaluate the office worker exposure scenario, the open space exposure scenario and the hypothetical future resident exposure scenario over the 1,000 year modeling period.

RECOMMENDATIONS

The working group recommends that the hypothetical future resident exposure scenario at the 85 mrem level be the Tier I action level for surficial soils in the buffer zone. The working group also recommends that the office worker exposure scenario at the 15 mrem level be the Tier I action level for surficial soils in the industrial area. Further, the working group is recommending that the Tier II action level for the entire site be the hypothetical future resident exposure scenario at the 15 millirem level. Soils with levels of radionuclides at or below the Tier II action level do not require remedial action and/or institutional controls. Although direct exposure to subsurface soils is not anticipated for the hypothetical future resident, open space or office worker exposure scenarios, the radionuclide working group currently recommends conservatively applying the Tier I and Tier II surface soil action levels to the subsurface soils. This subsurface soil recommendation may be updated in the future. Table ES-1 outlines these Tier I and Tier II action levels.

This working group acknowledges that in the future, new regulations, different guidance, improved calculation methods and models and better input parameters will likely become available. As this new information becomes available it will be considered in accordance with paragraph 5 of RFCA.

APPLICATION

Action levels as calculated above are only applicable when a single radionuclide is found in the environment. This is not the case at RFETS. In the environment at RFETS, the uranium (U) isotopes of U-234, U-235 and U-238 are found together, and the americium (Am) and plutonium (Pu)

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isotopes of Am-241 and Pu-239/240 are found together. When multiple radionuclides are found in the environment, it must be ensured that the sum of the radiation doses from all radionuclides present does not exceed the action level basis (e.g., a hypothetical future resident assessed at the 15 mrem level).

The action levels for americium and plutonium together can also be calculated since the activity of Am-241 is about 18% of the Pu-239+Pu-240 (Pu-239/240) activity in the environment (Ibrahim, 1996). Given this activity ratio, the action level for Am-241 and Pu-239/240 can be computed so that the sum of their radiation doses equals either 15 or 85 millirem to the appropriate exposure scenario. Table ES-1 includes an example of these adjusted action levels for Am-241 and Pu-239/240 if they are the only radionuclides present in soil. Since the 18% ratio actually varies in the environment, site specific data will be used to make action level comparisons. If uranium is also present in the soil, then the contribution to the radiation dose from the uranium also needs to be assessed so that the Tier I and/or Tier II action level basis is not exceeded.

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TABLE ES-1
TIER I & II SOIL ACTION LEVELS

Tier I Action Level For The Buffer Zone (Hypothetical Resident)

Radionuclide	Hypothetical Resident - 85 mrem Annual Radiation Dose (a) (pCi/gram)	Hypothetical Resident - Ratio Sum to 85 mrem Annual Radiation Dose (b) (pCi/gram)
Americium-241	215	117
Plutonium-239/240	1429	651
Uranium-234	1738	
Uranium-235	135	
Uranium-238	586	

Tier I Action Level for The Industrial Area (Office Worker)

Radionuclide	Office Worker - 15 mrem Annual Radiation Dose (a) (pCi/gram)	Office Worker - Ratio Sum to 15 mrem Annual Radiation Dose (b) (pCi/gram)
Americium-241	209	101
Plutonium-239/240	1088	562
Uranium-234	1627	
Uranium-235	113	
Uranium-238	506	

Tier II Action Level For RFETS (Hypothetical Resident)

Radionuclide	Hypothetical Resident - 15 mrem Annual Radiation Dose (a) (pCi/gram)	Hypothetical Resident - Ratio Sum to 15 mrem Annual Radiation Dose (b) (pCi/gram)
Americium-241	38	21
Plutonium-239/240	252	115
Uranium-234	307	
Uranium-235	24	
Uranium-238	103	

(a) - These values apply to single radionuclides only which does not occur in the environment at RFETS. The "Sum of Ratios" method will be applied at RFETS so that the total dose from multiple radionuclides are correctly assessed.

(b) - This example assumes that the Am-241/Pu-239 activity ratio equals 0.18 and that only Pu-239 and Am-241 are present

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SECTION 1

INTRODUCTION

During the Rocky Flats Cleanup Agreement (RFCA) negotiations, the Action Levels and Standards Framework for Surface Water, Ground Water and Soils (ALF) Working Group realized that setting soil action levels and cleanup standards for radionuclides was a complex process and could not be completed before public notice of the draft RFCA. Therefore a radionuclide working group was formed to undertake this task. This report discusses the formation of a radionuclide working group, the radionuclide working group's application of the 15/75 mrem methodology as outlined in the draft RFCA and the radionuclide working group's recommendations concerning radionuclide action levels in soils.

Section 2 of this report discusses the formation of the radionuclide working group along with the goals of the working group. The working group members represent the US Department of Energy (DOE), the US Environmental Protection Agency (EPA), the Colorado Department of Public Health and the Environment (CDPHE) and Kaiser-Hill (K-H) , L.L.C.

Section 3 of this report is a regulatory analysis that describes the regulatory basis for deriving radionuclide action levels in soils. Regulations promulgated by the DOE, EPA and Nuclear Regulatory Commission (NRC) are examined.

Section 4 of this report contains the site conceptual model for surface and subsurface soil assessment. The site conceptual model is the basis for the exposure scenarios used to derive action levels for soils.

Section 5 of this report discusses how the soil action levels were developed. The use of the RESRAD computer model is discussed and the action levels for all applicable exposure scenarios are given.

Appendix A of this report discusses the development of the parameter inputs to the RESRAD computer code for the hypothetical future resident exposure scenario, the open space exposure

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scenario and the office worker exposure scenario. RESRAD computer code outputs are also in this appendix.

Appendix B of this report discusses the expected chemical form of plutonium in the environment. The chemical form of radioactive material is significant for assessing radiation dose.

Appendix C of this report is an exposure pathway analysis. The exposure pathways applicable to the hypothetical future resident exposure scenario, the open space exposure scenario and the office worker exposure scenario are discussed and delineated.

Appendix D of this report discusses the relative importance of different isotopes of plutonium with respect to human health. The decay of plutonium, the ingrowth of daughters and plutonium toxicity are examined.

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SECTION 2

RADIONUCLIDE WORKING GROUP FORMATION AND GOALS

The radionuclide working group convened in early March 1996 and was composed of personnel from the DOE, the EPA, the CDPHE and the K-H Team. The Working Group agreed that its charter was to determine the derivation and application of the 15 mrem per year level as well as the derivation and potential application of the 75 mrem per year level as outlined in the Rocky Flats Cleanup Agreement. The Working Group recognized that the 15/75 requirement was based on EPA's preliminary proposed 40CFR196, Radiation Site Cleanup Regulations.

The goals of the Working Group were:

- To determine and recommend radionuclide action levels for soil;
- To determine and recommend radionuclide put-back levels for soil; and
- To prepare a draft technical justification document which would explain the Working Group's recommendations.

The Working Group believes its recommendations are based on a sound technical, scientific and regulatory foundation. The Working Group has consulted with the Citizens Advisory Board (CAB), the Cities of Broomfield, Westminster, Northglenn and Thornton, and the Rocky Flats Environmental Technology Site (RFETS) expert panel on radionuclide fate and transport concerning any recommendations. Proposed modifications to ALF and a discussion of put-back levels can be found in the document entitled, "Modifications to the Action Levels and Standards Framework."

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SECTION 3
REGULATORY ANALYSIS OF RADIONUCLIDES IN SOILS

3.1 Introduction

In order to calculate action levels for radionuclides, a target radiation dose to an individual must be defined. This target radiation dose could be applicable to a current or future individual. After the target radiation dose is selected, the amount of radioactive material in the environment that corresponds to this target radiation dose can be calculated. This calculated value is the action level.

To select the target radiation dose, applicable regulations need to be reviewed so that regulatory requirements are met. Applicable regulations from the DOE, the EPA and the NRC were reviewed. The following radiation dose standards may apply to the assessment and remediation of radionuclides in the environment at the RFETS. These standards were evaluated so that the requirements of both current and proposed radiation protection standards could be assessed.

- * DOE Order 5400.5, "Radiation Protection of the Public and the Environment."
- * Proposed Title 10 of the Code of Federal Regulations, Part 834, "Radiation Protection of the Public and the Environment," revised August 25, 1995 (Proposed 10CFR834).
- * Draft Title 40 of the Code of Federal Regulations, Part 196, "Radiation Site Cleanup Regulations," dated October 21, 1993 (Draft 40CFR196).
- * Proposed Title 10 of the Code of Federal Regulations, Parts 20, 30, 40, 50, 51, 70 & 72, "Radiological Criteria for Decommissioning," dated August 22, 1994 (Proposed 10CFR-NRC).

None of the above regulations is based on assessing and remediating radioactive materials based on

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risk assessment. EPA is promoting this departure from risk assessment with their draft 40CFR196. Since the DOE, EPA and NRC are promulgating regulations using radiation dose to assess and remediate radioactive material in the environment, risk assessment will not be the basis for calculating action levels.

The requirements of the National Emission Standards for Hazardous Air Pollutants (NESHAPS) are not being considered to develop action levels; however, DOE is obligated to comply with the requirements of NESHAPS as long as RFETS is a DOE site. The DOE currently has a NESHAPS program in place. If monitoring detects a significant increase in emissions of radionuclides to the ambient air that may be due to radionuclides in soils, a source evaluation and mitigating action may be required. The action levels should be consistent with the NESHAPS requirements, since even the worst areas of soil contamination do not currently cause ambient air to exceed the NESHAPS standards.

3.2 DOE Order 5400.5

DOE Order 5400.5 prescribes the use of a 100 millirem annual radiation dose limit as recommended by the International Commission on Radiological Protection (ICRP, 1977). This order includes a recommendation that a 30 mrem radiation dose limit be applied if the actual use of a site is being examined or if the likely future use of a site is being examined. The order states that acceptable levels of radionuclides in soil shall be derived based on an environmental pathway analysis with specific property data where available. The order further states that acceptable residual radionuclide concentrations will be derived using the RESRAD (Argonne, 1993) environmental transport and radiation dose computer code. An As Low As Reasonably Achievable (ALARA) analysis must be a part of the RESRAD analysis. An ALARA analysis tries to reduce the radiation dose limit taking into account economic, social and technical factors.

The actual use or the likely future use exposure scenario represents the individual that could receive

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the largest radiation dose. For exposure scenarios considered to be less likely but plausible, the 100 millirem/year limit should not be exceeded. These exposure scenarios could include a resident, an industrial worker and/or a recreational user. Radiation dose is assessed for these exposure scenarios every year in a 1,000 year time period.

3.3 Proposed 10CFR834

The provisions of DOE Order 5400.5 are currently being proposed as 10CFR834. Proposed 10CFR834 reiterates the 100 millirem per year radiation dose standard and also states that the starting point for an ALARA analysis would be 25 to 30 millirem per year. This regulation requires an environmental pathway analysis using approved models such as RESRAD to derive acceptable levels of radionuclides in the soil. With respect to exposure scenarios, 10CFR834 states that the actual and likely use scenarios and the worst plausible use scenario shall be evaluated. The requirement to evaluate the worst plausible use is only a secondary check to ensure that application of the likely use scenario does not overlook an extremely hazardous situation or a very susceptible subgroup. 10CFR834 also recommends that the dose assessment be performed for a 1,000 year time period.

3.4 Draft 40CFR196

Draft 40CFR196 states that a remediation standard of 15 mrem/yr should be used at sites with radioactive material in all environmental media. This radiation dose limit would apply to sites where the future land use is either unrestricted or restricted following remediation activities. If the land use at a site is restricted (e.g., restricting land use to open space use), the 15 mrem/year limit would apply to the restricted land use. If the land use is restricted, draft 40CFR196 also requires the assessment of the unrestricted release exposure scenario (i.e., residential exposure scenario). The radiation dose to be received by an unrestricted release exposure scenario will not exceed 75 mrem/yr (This has recently been updated to 85 mrem/yr.) so that any individual will not receive more than the ICRP recommended dose limit of 100 millirem even if land use restrictions fail in the future. An

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ALARA analysis is not required.

EPA performed an extensive regulatory review before promulgating draft 40CFR196. The preamble to draft 40CFR196 compares the risks associated with remediation, transportation and disposal of contaminated soils against the risks of leaving contaminated soils in place at the 15/75 mrem per year dose limit. EPA concluded that the use of a 15/75 mrem dose limit is protective of the public. EPA recognized that the dose assessment process incorporates all pertinent facets of a CERCLA risk assessment process.

A 1,000 year time period also needs to be assessed to comply with the requirements in draft 40CFR196. This requirement came from the fact that many sites contain radionuclides with very long half-lives. The use of this assessment period will ensure that the creation of decay products and the long-term integrity of any land use restrictions are adequately considered.

3.5 Proposed 10CFR-NRC

The proposed NRC decommissioning regulations are directly comparable to the EPA's draft 40CFR196 regulations. The NRC uses a 15 mrem/yr radiation dose limit for both unrestricted and restricted land uses at a site just like the EPA draft standard. If a site is implementing land use restrictions, the NRC allows an individual in the future to receive a radiation dose of 100 millirem instead of 85 millirem. The NRC uses a 1,000 year assessment period and requires that an ALARA analysis be performed.

3.6 Rocky Flats Cleanup Agreement Regulatory Basis

The Radionuclide Action Levels Working Group has decided to use the draft 40CFR196, "Radiation Site Cleanup Regulations," regulations to derive action levels at the RFETS. This decision was made by the working group for the following reasons:

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- * Remediation activities at the RFETS follow EPA and State of Colorado remediation requirements as outlined in the Rocky Flats Cleanup Agreement (RFCA). For radionuclide remediation, EPA's most current regulations need to be addressed.
- * Draft 40CFR196 is based on an extensive review of available radiation protection information.
- * Draft 40CFR196 is expected to be promulgated in the near future.
- * Draft 40CFR196 is not inconsistent with the requirements of DOE Order 5400.5, proposed 10CFR834 and the proposed NRC decommissioning regulations.
- * NRC regulations do not apply to DOE facilities.

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SECTION 4 SITE CONCEPTUAL MODEL

4.1 Introduction

The Site Conceptual Model (SCM) outlines the land uses that are expected to be present at the RFETS so that action levels can be calculated for these future land uses. The type of land use is very important since the amount of time an individual may contact radioactive material in the environment is directly related to the selected land use. This contact time is then transformed into an amount of radioactive material inhaled or ingested by the individual. Action levels are derived from the radiation dose associated with radioactive material inhaled and ingested, and from external gamma exposure.

4.2 Land Uses at RFETS

Future activities at RFETS include environmental restoration, decontamination and decommissioning, economic development and waste management. The Rocky Flats Local Impact Initiative is currently working with DOE and local development agencies to encourage business development at RFETS. The Rocky Flats Future Site Uses Working Group has also developed recommendations regarding future use of the RFETS property. Residential development at RFETS has not been recommended by this group or by other planning groups. Commercial and industrial uses of developed portions of the site are considered beneficial. Even though commercial development in undeveloped portions of the property has not been ruled out, preservation of this area as open space is consistent with DOE policy, the Rocky Flats Future Site Working Group recommendations and the Jefferson County Planning Department's recommendations. The Jefferson County Board of Commissioners has also adopted a resolution stating its support of maintaining, in perpetuity, the undeveloped buffer zone as open space (DOE, 1995). Open space use assumes no development in these areas.

The land uses for RFETS are prescribed by the Rocky Flats Cleanup Agreement (RFCA) in the

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preamble to that document (RFCA, 1996). The preamble states that cleanup decisions and activities are to be based on open space use and limited industrial use at RFETS. These land uses are consistent with the direction of local government as outlined above. In the near-term condition, the inner and outer buffer zones will be managed and remediated to accommodate open space uses. At the beginning of the intermediate term condition, open space use in these areas will still be applicable. Industrial uses are applicable in the industrial area of the plant in the near and intermediate term conditions. The RFCA prescribes that specific future land uses and post-cleanup designations will be developed in consultation with local governments.

4.3 Surface Soil Assessment

To be consistent with the RFCA (RFCA, 1996), the basis for radionuclide action levels in surface soils is an open space exposure scenario in the buffer zone and an office worker exposure scenario in the industrial area of the plant. Consistent with 40CFR196, the working group agreed that the hypothetical future residential exposure scenario would also be evaluated. Although conservative, the assessment of a residential exposure scenario is inconsistent with current land use recommendations. Surface soils are defined as the top 15 cm of soil.

The open space exposure scenario assumes that an individual visits the buffer zone a limited portion of the year for recreational activities. This individual could hike on trails or wade in the creeks. This individual is assumed to be exposed to radioactive material in soils by directly ingesting the soils, by inhaling resuspended soils and by external gamma exposure from the soils. Appendix C, "Analysis of Exposure Pathways for use in Deriving Action Levels," contains a detailed discussion on the selection of these three exposure pathways. For an account of the amount of time the open space user spends at RFETS, see Appendix A, "Parameter Justification and RESRAD Output." The action level for the open space exposure scenario is the amount of a specific radioactive material in surface soil that would impart an annual radiation dose of 15 millirem to the open space user during the 1,000 year assessment period.

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The office worker exposure scenario assumes that an individual works mainly indoors in a building complex surrounded by extensive paved areas or well maintained landscaping. This individual is assumed to breath outside air and ingest soil from outside the building. This individual is assumed to be exposed to radioactive material in soils by directly ingesting the soils, by inhaling resuspended soils and by external gamma exposure from the soils. Appendix C, "Analysis of Exposure Pathways for use in Deriving Action Levels," contains a detailed discussion on the selection of these three exposure pathways. For an account of the amount of time the office worker spends at RFETS, see Appendix A, "Parameter Justification and RESRAD Output." The action level for the office worker exposure scenario is the amount of a specific radioactive material in surface soil that would impart an annual radiation dose of 15 millirem to the office worker during the 1,000 year assessment period.

The hypothetical future residential exposure scenario assumes that an individual resides at RFETS. This individual lives at RFETS all year and eats homegrown produce. This individual is assumed to breath outside air and ingest soil from outside the residence. This individual is assumed to be exposed to radioactive material in soils by directly ingesting the soils, by inhaling resuspended soils, by external gamma exposure from contaminated soil and by ingesting produce grown in contaminated soil. Appendix C, "Analysis of Exposure Pathways for use in Deriving Action Levels," contains a detailed discussion on the selection of these four exposure pathways. For an account of the amount of time the resident spends at RFETS, see Appendix A, "Parameter Justification and RESRAD Output." The action level for the residential exposure scenario is the amount of a specific radioactive material in surface soil that would impart an annual radiation dose of 15 millirem or 85 millirem to the hypothetical resident during the 1,000 year assessment period.

In order to carry out the original weapon-building mission, personnel at RFETS handled plutonium (Pu), americium (Am) and uranium (U) in a number of different operations. Rocky Flats plutonium was composed of Pu-238, Pu-239, Pu-240, Pu-241, Pu-242 and Am-241 (DOE, 1980), and the isotopes of uranium handled at RFETS are U-234, U-235 and U-238. Action levels in soils have been derived for Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, Am-241, U-234, U-235 and U-238 in the

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environment.

To calculate the radiation dose to an individual, appropriate Dose Conversion Factors (DCF) must be chosen. These DCFs convert the radioactive material present in an exposure route to a radiation dose. The three exposure routes are the ingestion, inhalation and external gamma exposure from radioactive material in soil. DCFs are therefore available for the ingestion, inhalation and external exposure routes. The DCF for each exposure route differs with the chemical form of the radionuclide. The chemical form for americium, uranium and all daughter products were conservatively chosen so that the DCF would be maximized for each exposure route. The DCFs for plutonium were chosen based on the oxide form. For a detailed discussion of the chemical form of plutonium in the environment, see Appendix B, "Analysis of the Chemical Form of Plutonium in the Environment."

4.4 Subsurface Soil Assessment

Subsurface soils are defined from 15 cm below the ground surface to the top of the ground water table. There are no exposure pathways present for the open space, office worker or hypothetical resident exposure scenarios to subsurface soils. Therefore, these exposure scenarios are not appropriate for subsurface soils. For this reason, the RFCA (RFCA, 1996) states that action levels derived for subsurface soils will be protective of surface water standards via ground water transport of radionuclides leached from subsurface soils. The surface water standard for radionuclides is the Maximum Contaminant Level (MCL) as defined by the RFCA.

The SCM for subsurface soils is represented by radionuclides first leaching from subsurface soils to ground water. The radionuclides in ground water are then transported to surface water where the radionuclide concentration cannot exceed the MCL. The subsurface soil action level is the smallest amount of a specific radioactive material in subsurface soil that would impart an MCL in surface water over the 1,000 year assessment period.

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This subsurface soil SCM was examined closely by the radionuclide working group. The geohydrology of the RFETS was examined along with the subsurface soil transport properties of plutonium, americium, uranium and their daughter products. Also, the relationship between the subsurface soil SCM and the surface soil SCM was examined. The radionuclide working group came to the conclusion that a subsurface soil action level for radionuclides could not be developed at this time with the subsurface soil SCM defined by the RFCA. This conclusion was based on the variable characteristics of the SCM. This variability is attributable to 1) a water infiltration rate into the soil which varies both areally across the site and within the subsurface soils, 2) radionuclide-specific distribution coefficients that vary spatially within the subsurface soil, 3) a variable distance from a source of radioactive material in the subsurface soil to surface water and 4) a variable soil unsaturated/saturated zone thickness across RFETS. For these reasons, the radionuclide working group has decided to conservatively apply surface soil action levels to subsurface soils.

Currently there are efforts proceeding that may reduce the variability in the subsurface soil SCM. In the future, this variability may be reduced sufficiently to allow the application of the prescribed subsurface soil SCM. If this occurs, the current recommendation of the radionuclide working group may be modified.

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SECTION 5 ACTION LEVEL DEVELOPMENT

5.1 Introduction

All of the ingredients for developing action levels for radionuclides in surface soils have been delineated in the preceding sections. A radiation dose limit has been established, the applicable exposure scenarios have been defined and the type of soil to be assessed has been defined. All of these facets allow the calculation of a surface soil action level for the open space exposure scenario, the office worker exposure scenario and the hypothetical future residential exposure scenario. Due to the complex nature of action level development, a computer model must be utilized to derive the action levels. The RESRAD computer model was selected for use since it fulfills all modeling requirements. Action levels were developed for the given exposure scenarios in surface soils. These action levels will be used as Tier I and Tier II action levels in the Action Levels and Standards Framework for Surface Water, Groundwater and Soils (RFCA, 1996).

5.2 Computer Code Requirements

There are a number of different processes that need to be assessed to derive action levels. Due to the complexity of each of these processes, it would be beneficial to have a computer code that would assess each of the following processes. For efficiency and compatibility reasons, the ideal computer code would incorporate all of the following processes. It is also important that the computer code(s) be validated and verified.

The first process that has to be modeled is the transport of radioactive material in surface soil to an individual. This transport can include soil transport in air, surface water, ground water and/or unsaturated zone pore water. For assessing surface soil, the most important environmental transport process for deriving action levels is the air transport process. This is important for the inhalation exposure pathway. All other environmental transport processes serve to decrease the amount of

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radioactive material present in surface soil. This decrease in radioactive material over time increases the action level over time. All environmental transport processes modeled must be able to assess the movement of radioactive material and their daughter products over the 1,000 year assessment period.

The second process that needs to be examined is the exposure of a receptor to the radioactive material in the soil. There are four exposure pathways that need to be assessed by the chosen computer code. These pathways include incidental ingestion of soil, inhalation of resuspended soil, external gamma exposure from radionuclides in the soil and ingestion of homegrown produce.

The next process to be concerned with is radiation dosimetry. Once the radioactive material enters the body, a radiation dose must be calculated so that an action level can be derived. There are three modes through which radioactive material can impart radiation dose to an individual. These are through the ingestion of radioactive material, the inhalation of radioactive material and external gamma exposure from radioactive material in soil. All three of these radiation dose modes need to be assessed for each radionuclide. Since a 1,000 year assessment period is required, the radiation dose from daughter products must also be assessed.

5.3 Computer Code Selection

The RESRAD computer code (Argonne, 1993) was selected for use in deriving surface soil action levels because it meets all modeling requirements. RESRAD was developed at Argonne National Laboratory for the US Department of Energy (DOE) so that radiation dose to an individual as well as action levels could be derived for radioactive material in soils. RESRAD can model all four of the above processes in an integrated manner and can assess daughter products over the 1,000 year modeling period. RESRAD has also been validated and verified (Argonne, 1994).

Surface soils can be physically modeled by the RESRAD code. Soils are broken down into layers within the code, and the top layer, at the ground surface, can be a cover or a contaminated zone. For

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deriving surface soil action levels, the contaminated zone is considered to be the surface soils with no cover. Underneath the contaminated zone, RESRAD has the capacity to model five separate uncontaminated/unsaturated layers before reaching ground water. This configuration meets the requirements for deriving action levels at the RFETS.

RESRAD can model the required environmental transport processes. It contains an air transport algorithm that looks at resuspension of radioactive material in soils and transport to an individual. The assessment of the air transport pathway is essential to calculating surface soil action levels. Unsaturated zone transport and ground water transport processes are also assessed within the RESRAD code. These two algorithms will allow leaching of radioactive material out of the surface soils for the 1,000 year assessment period. These unsaturated zone transport and ground water transport algorithms could be used in the future to model the leaching of contaminants from subsurface soils at the RFETS. With respect to environmental transport requirements, RESRAD meets the requirements for deriving action levels at RFETS.

The RESRAD code can model the four exposure pathways: incidental ingestion of soil, inhalation of resuspended soil, external gamma exposure from radionuclides in the soil and ingestion of homegrown produce. RESRAD can assess nine exposure pathways in total. These exposure pathways are external gamma exposure, soil inhalation, plant ingestion, meat ingestion, milk ingestion, aquatic food ingestion, drinking water ingestion, soil ingestion and radon exposure. This shows the flexibility of the RESRAD code in assessing many different situations. Exposure pathways can be turned on and off in RESRAD depending on the specific situation. Concerning exposure pathways, this meets the requirements for deriving action levels at the RFETS.

The RESRAD code also has an extensive library of radionuclides in their radiation dosimetry module. This allows the calculation of radiation dose and action levels on the radionuclides of interest and on their daughter products over the 1,000 year modeling period. The radionuclide database includes inhalation, ingestion and external exposure Dose Conversion Factors (DCF). These DCFs are also

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available within RESRAD for the different chemical forms of radionuclides. Concerning the use of DCFs, this meets the requirements for deriving action levels at the RFETS.

5.4 RESRAD Parameter Input Development

There were four separate RESRAD computer runs that needed to be performed to obtain all required action levels. These included the following:

- * An Open Space Exposure Scenario Assessed at the 15 Millirem Level
- * An Office Worker Exposure Scenario Assessed at the 15 Millirem Level
- * A Hypothetical Future Resident Assessed at the 15 Millirem Level
- * A Hypothetical Future Resident Assessed at the 85 Millirem Level

There were 53 separate input parameters to the RESRAD code for the open space and office worker exposure scenarios. The hypothetical future resident had 83 separate input parameters. The parameters for all of these exposure scenarios were chosen to be as site specific as possible to satisfy the requirements of the site conceptual model. When a site specific parameter was not available, the RESRAD default parameter was used. For a discussion of all parameter inputs with their selected values, see Appendix A, "Parameter Justification and RESRAD Output."

5.5 RESRAD Modeling Results

Table 5-1, "Single Radionuclide Soil Action Levels," outlines the Tier I and Tier II action levels developed using RESRAD. The action levels in this table represent the radionuclide-specific activity in the soil that would impart a maximum radiation dose of either 15 millirem or 85 millirem to the given exposure scenario over the 1,000 year modeling period.

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5.6 Use of RESRAD Modeling Results

The action levels outlined above need to be applied in the field. To do this, a number of simplifying assumptions can be made while still assuring the protectiveness of the action levels. This simplification allows implementation of these action levels in an efficient manner.

The first simplification is that the number of radionuclides needing assessment at RFETS can be reduced. All uranium (U) radionuclides present at RFETS (e.g., U-234, U-235 and U-238) in the environment will be assessed with respect to their action levels. Appendix D, "Analysis of Assessment Needs for Rocky Flats Plutonium," outlines the reasons why the only constituents from Rocky Flats plutonium that need to be assessed in the environment are Pu-239, Pu-240 and Am-241. All isotopes of Rocky Flats plutonium were initially assessed for completeness since plutonium in the nuclear fabrication process was composed of Pu-238, Pu-239, Pu-240, Pu-241 and Pu-242 (DOE, 1980). Am-241 is also contained in this mix of plutonium due to its ingrowth from Pu-241 (DOE, 1980). The plutonium found in the environment though will have different activities of plutonium and americium than what is found in the fabrication process because of radionuclide decay and ingrowth over time. In examining this decay and ingrowth with regard to radionuclide toxicity, it is shown in Appendix D that it is necessary to only assess Pu-239, Pu-240 and Am-241 in the environment.

The number of exposure scenarios that need to be examined can also be reduced. The more conservative of the Tier I action level for the open space exposure scenario and the Tier I action level for the hypothetical future resident will be applied in the buffer zone at RFETS. Also, the more conservative of the Tier I action level for the office worker exposure scenario and the Tier I action level for the hypothetical future resident will be applied in the industrial area at RFETS. These comparisons were made and the result is that the Tier I action level in the buffer zone will be based on the hypothetical future resident exposure scenario and that the Tier I action level in the industrial area will be based on the office worker exposure scenario. Table 5-2, "Tier I & II Soil Action Levels," outlines the soil action levels after the above simplifications are made.

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To assure that the soil action levels will be protective of human health when multiple radionuclides are present, the sum of the radiation doses from all radionuclides in soil must not exceed the Tier I or Tier II dose limit of 15 millirem or 85 millirem. A "Sum of Ratios" method will be used when more than one radionuclide is present in soils. Table 5-3, "Sum of Ratios Example," outlines this method. First, a ratio is formed for each radionuclide by dividing the activity of the radionuclide found in soils by the appropriate soil action level. This ratio actually represents the fraction of the radiation dose from the action level. In Table 5-3, the action level chosen for comparison is the Tier II action level for RFETS which is the hypothetical future resident assessed at the 15 millirem level. In this example, the radiation dose from U-235 is 1% of 15 millirem or 0.15 millirem at a soil activity of 0.3 pCi/gram. Therefore, when the ratio from each radionuclide is summed, this ratio sum is the fraction of the radiation dose limit for the action level. In Table 5-3, the sum of the ratios is 0.22 or 22% of 15 millirem. In this example, the Tier II action level is not exceeded since the sum of ratios is less than or equal to 1.0. If the sum of ratios exceeded 1.0, the action level would be exceeded.

The action levels for americium and plutonium together can also be calculated since the activity of Am-241 is about 18% of the Pu-239+Pu-240 (Pu-239/240) activity in the environment (Ibrahim, 1996). Given this activity ratio, the action level for Am-241 and Pu-239/240 can be computed so that the sum of their radiation doses equals either 15 or 85 millirem to the appropriate exposure scenario. Table 5-2 includes an example of these adjusted action levels for Am-241 and Pu-239/240 if they are the only radionuclides present in soil. Since the 18% ratio actually varies in the environment, site specific data will be used to make action level comparisons. If uranium is also present in the soil, then the contribution to the radiation dose from the uranium also needs to be assessed so that the Tier I and/or Tier II action level basis is not exceeded.

Chemical action levels are risk-based, and chemical risk is considered additive when multiple chemicals are present. Radionuclide action levels are dose-based, and radiation dose is considered additive when multiple radionuclides are present. Chemicals and radionuclides will be assessed independently on a project-specific basis using methodology that is protective of human health and

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the environment. The cumulative effects of chemicals and radionuclides will be assessed on a project-specific basis if the chemical risk and the radionuclide dose are near their respective Tier I action levels.

5.7 Action Level Uncertainties

The calculated values recommended as action levels are based on several assumptions which have associated limitations. These include:

1. The regulatory basis for developing these action levels is EPA's draft rule, 40CFR196, which is not yet final and may be changed before it is promulgated.
2. Any environmental computer model, including the RESRAD model, has inherent limitations with regard to precise simulation of the actual environment. Some of these limitations involve which input parameters are chosen to represent the complex natural setting which may vary across a large site. Environmental transfer factors and dose conversion factors used in the model may not always reflect site-specific conditions.
3. There are inherent uncertainties in estimating either dose or risk from ionizing radiation.
4. Institutional controls will eliminate the ground water ingestion pathway by establishing specific land uses and controls on ground water use. A basic assumption of RFCA is that ground water from contaminated areas of the site is captured, controlled and measured within the surface water system before leaving the site. An additional assumption is that the small amount of shallow ground water is not a sustainable, viable source of residential drinking water.
5. Attachment 5 of RFCA requires subsurface soil action levels to be protective of surface water

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standards via ground water, and surface soil action levels to be protective of surface water standards via runoff. Existing data supports the proposition that radionuclides in soil are stable and relatively immobile. This is the basis for determining not to include these transport pathways in the modeling done to develop the proposed action levels. It is also assumed that actions required by the proposed action levels for radionuclides in soil (removals and/or stabilization) will provide sufficient protection for surface water. Those actions will control the worst areas of radiological contamination in soils, and so far, even these areas have not impacted surface water above the 0.15 pCi/L level at the point of compliance.

6. The proposal to set subsurface soil action levels equal to surface soil action levels assumes there will be no uncontrolled human exposure to subsurface soils and presumes that surface soil action levels will be protective of surface water via ground water. It is also assumed that the proposed surface soil action levels are lower than values that any subsurface soil modeling would produce.

This working group acknowledges that in the future, new regulations, different guidance, improved calculation methods and models and better input parameters will likely become available. As this new information becomes available it will be considered in accordance with paragraph 5 of RFCA.

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TABLE 5-1
SINGLE RADIONUCLIDE SOIL ACTION LEVELS

Radionuclide	<u>TIER I</u> <u>ACTION</u> <u>LEVEL</u> Open Space Exposure Scenario, Surficial Soils Exposure, 15 Millirem Dose Limit (pCi/gram)	<u>TIER I</u> <u>ACTION</u> <u>LEVEL</u> Office Worker Exposure Scenario, Surficial Soils Exposure, 15 Millirem Dose Limit (pCi/gram)	<u>TIER I</u> <u>ACTION</u> <u>LEVEL</u> Hypothetical Residential Exposure Scenario, Surficial Soils Exposure, 85 Millirem Dose Limit (pCi/gram)	<u>TIER II</u> <u>ACTION</u> <u>LEVEL</u> Hypothetical Residential Exposure Scenario, Surficial Soils Exposure, 15 Millirem Dose Limit (pCi/gram)
Americium-241	1283	209	215	38
Plutonium-238	10580	1164	1529	270
Plutonium-239	9906	1088	1429	252
Plutonium-240	9919	1089	1432	253
Plutonium-241	48020	7801	19830	3499
Plutonium-242	10430	1145	1506	266
Uranium-234	11500	1627	1738	307
Uranium-235	1314	113	135	24
Uranium-238	5079	506	586	103

* The action levels in this table apply to single radionuclides only which does not exist at RFETS. See text for application of these action levels.

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TABLE 5-2
TIER I & II SOIL ACTION LEVELS

Tier I Action Level For The Buffer Zone (Hypothetical Resident)

Radionuclide	Hypothetical Resident - 85 mrem Annual Radiation Dose (a) (pCi/gram)	Hypothetical Resident - Ratio Sum to 85 mrem Annual Radiation Dose (b) (pCi/gram)
Americium-241	215	117
Plutonium-239/240	1429	651
Uranium-234	1738	
Uranium-235	135	
Uranium-238	586	

Tier I Action Level for The Industrial Area (Office Worker)

Radionuclide	Office Worker - 15 mrem Annual Radiation Dose (a) (pCi/gram)	Office Worker - Ratio Sum to 15 mrem Annual Radiation Dose (b) (pCi/gram)
Americium-241	209	101
Plutonium-239/240	1088	562
Uranium-234	1627	
Uranium-235	113	
Uranium-238	506	

Tier II Action Level For RFETS (Hypothetical Resident)

Radionuclide	Hypothetical Resident - 15 mrem Annual Radiation Dose (a) (pCi/gram)	Hypothetical Resident - Ratio Sum to 15 mrem Annual Radiation Dose (b) (pCi/gram)
Americium-241	38	21
Plutonium-239/240	252	115
Uranium-234	307	
Uranium-235	24	
Uranium-238	103	

(a) - These values apply to single radionuclides only which does not occur in the environment at RFETS. The "Sum of Ratios" method will be applied at RFETS so that the total dose from multiple radionuclides are correctly assessed.

(b) - This example assumes that the Am-241/Pu-239 activity ratio equals 0.18 and that only Pu-239 and Am-241 are present

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TABLE 5-3
SUM OF RATIOS EXAMPLE

15 mrem Residential Action Level Comparison

Radionuclide	Action Level (pCi/gram)	Soil Activity (pCi/gram)	Soil Activity to Action Level Ratio
Americium-241	38	2.6	0.07
Plutonium-239	252	13.8	0.05
Uranium-234	307	6.8	0.02
Uranium-235	24	0.3	0.01
Uranium-238	103	6.4	0.06
		SUM OF RATIOS	0.22

Decision Criteria

SUM OF RATIOS \leq 1: ACTION LEVEL MET

SUM OF RATIOS > 1: ACTION LEVEL EXCEEDED

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SECTION 6 REFERENCES

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Appendix M

PROCESS DESCRIPTION FOR EVALUATING IMPACTS TO SURFACE WATER AND ECOLOGICAL RESOURCES

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APPENDIX M

Process Description for Evaluating Groundwater Impacts to Surface Water and Ecological Resources

1.0 INTRODUCTION

The purpose of this appendix is to provide a "process description" to integrate the goals and objectives of groundwater monitoring, hydrogeologic characterization, and remedial actions at RFETS. The intent of this process description is not to prescribe specific analyses that must be performed, but to present a general approach that defines how groundwater contamination at RFETS will be assessed and addressed. By developing an integrated process, it is expected that the basis for decisions regarding the need for remediation and the evaluation of remediation performance will be consistent and will effectively protect surface water and ecological resources. A description of the groundwater plume management and remediation strategy is provided in the IMP Background Document. This appendix encompasses the content of the strategy in the IMP.

In essence, the groundwater contamination assessment and remediation evaluation process consists of the following phases:

- Initial determination of actual or potential groundwater contamination
- Development of a conceptual model based on adequate characterization of the source, nature, and extent of groundwater contamination
- Evaluation of whether contaminated groundwater has or will adversely impact surface water and ecological resources
- Evaluation of alternatives for mitigating groundwater contamination which impacts surface water or ecological resources, and the selection of an appropriate remedial action
- Verification of the appropriateness or effectiveness of the selected remedial action

In the following sections, each of these phases is discussed in more detail

1.1 INITIAL DETERMINATION OF GROUNDWATER CONTAMINATION

This phase is intended to determine whether there is a potential contamination problem. During this phase, no attempt will be made to determine the cause of contamination or how the groundwater contamination is distributed. The evaluation of the presence of groundwater contamination, and if the contamination could impact surface water, is the first threshold when determining if further action is required.

Previous groundwater monitoring programs such as the OU RI/RFI and site-wide characterization activities have made an initial determination of the areas where groundwater

is contaminated. The IMP provides for continued monitoring to assess changes in these areas of groundwater contamination and to identify new problem areas.

1.2 CHARACTERIZATION OF THE GROUNDWATER CONTAMINATION AREA (PLUME EVALUATION)

The primary purpose for characterizing and evaluating the nature and extent of groundwater contamination is to obtain sufficient data to support the development of a conceptual model of the problem area and to support the analyses necessary to evaluate the impact to surface water or ecological resources. Characterization may include, but is not limited to:

- Defining the extent of groundwater contamination
- Identifying potential source areas and contaminants of concern
- Defining plume extent through determining the linear and areal extents of the pathway through subsurface correlation of standard thickness and permeable lithologies
- Recharge and discharge through quantification of water balance, flow velocity, gradient, and direction of groundwater
- Concentration loadings and mass flux of contaminants to surface water
- Effects due to seasonal variations, natural attenuation of contaminants, or changes in discharge due to construction/removal of containment structures, treatment systems or removal of sources

Decisions with respect to plume evaluations will be made with consultation from the groundwater workgroup during various stages of the process. Results of the characterizations will be used to update the ER ranking process under RFCA to ensure that the available budget will be allocated to areas with the highest potential for contamination.

1.2.1 Evaluation of Existing Data

Once the available data have been compiled they can be used to develop a conceptual model of the groundwater contamination area. As the conceptual model is being formulated, ongoing evaluations will be performed to determine whether the data set is of sufficient quantity and quality to support the conceptual model. Some of the questions that should be answered include:

- Are the types of data adequate for the conceptual model (e.g., hydraulic conductivity, stratigraphic, and geologic, piezometric, water quality analyses for the contaminants of concern)
- Is the quantity of data sufficient (e.g., spatial or temporal coverage)
- Is the quality of the data set sufficient to address the program objectives (e.g., use of accepted analytical methods, meeting QA/QC objectives)

If a consideration of these questions shows that the available data are inadequate, then additional data should be collected to fill the data gaps.

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1.2.2 Collection of Additional Data

Prior to collecting any additional data, the DQOs should be defined to provide a clear purpose for collecting the additional characterization data. For example, an objective might be to better delineate groundwater flow direction, or to determine concentration trends within specific wells. Once the DQOs have been defined, then the appropriate sampling program may be developed and implemented. At this stage, the new data are incorporated and the conceptual model refined. The data questions outlined above should be addressed to determine whether the conceptual model is valid.

1.2.3 Establishing Baseline Conditions

The baseline assessment may have either of two purposes. The first purpose is to establish the current level of impacts to surface water or ecological resources. The second purpose may be to establish hydrogeologic conditions at specified locations prior to, during, or immediately after remediation.

In the first instance, the baseline case is used to determine whether changes in upgradient conditions will have an adverse or beneficial impact on downgradient surface water or ecological resources. In addition, the first type of baseline case can factor into the decision whether remediation or continued monitoring is the appropriate course of action to protect surface water or ecological resources. In the second instance, the baseline assessment will be the basis for evaluating how downgradient conditions change in response to upgradient remedial actions.

1.3 EVALUATION OF IMPACTS TO SURFACE WATER OR ECOLOGICAL RESOURCES

Pursuant to the RFCA, "[p]rotection of all surface water uses with respect to fulfillment of the Intermediate and Long-Term Site Conditions will be the basis for making soil and ground water remediation and management decisions." Therefore, it is necessary to evaluate the current and future impacts of groundwater on surface water or ecological resources to ensure that these resources are protected.

The evaluation of impacts to surface water will focus on three areas: the direct discharge of groundwater or seeps to surface water; the impact of groundwater to a specified reach of the stream (surface water and alluvium) downgradient from the point of discharge; and the concentration of contaminants at downstream surface water monitoring locations.

Ecological impact assessments will be based on site-specific conditions. The impact evaluations may either be supported directly by the data, by the use of analytical methods, or, if necessary, through the application of numerical models. The determination of which method of analysis to use will be based on the issues that are to be addressed, the limitations inherent in the data, the accuracy of the desired results, or available resources.

1.4 EVALUATION OF ALTERNATIVE REMEDIAL ACTIONS

Upon determination that contaminated groundwater has or may potentially impact surface water or ecological resources, alternative remediation scenarios should be evaluated. Alternative remedial actions include, but are not limited to:

- No action
- Source removal
- Source containment
- Plume containment
- Plume interception

Alternatives will be developed and considered on a site-by-site basis. The evaluation of alternatives will generally consist of the following steps:

- Definition of remediation objectives
- Determination of whether the data and conceptual model will support the analyses necessary to evaluate the different alternatives
- Completion of an alternatives assessment including the evaluation of surface-water or ecological impacts during remedy implementation, and in the future, considering the compatibility with other RFETS closure activities
- Selection of an alternative that is protective of surface water and ecological resources

The results of the alternatives analysis will be presented in a RFCA decision document. In essence, the documentation should summarize:

- The conceptual model describing hydrogeologic conditions
- The analytical tools used to evaluate the data
- The basis for selecting the parameters used for assessing system performance
- The type of impact, if any, to surface water or ecological resources
- How impacts have changed and may change with time
- The assessment of alternatives if remedial action is necessary
- Outline of remedial design/construction and/or monitoring actions as necessary

Development and consideration of alternatives will involve consultation with the groundwater working group during key phases of the process. Within this context, the parties should reach a consensus regarding specific contaminant source areas, groundwater plumes, and the appropriate response. Once an alternative has been selected, a remediation/management project will be developed with its own scope, schedule, and budget.

1.5 REMEDIAL DESIGN/CONSTRUCTION

If a remedial action decision has been reached, additional information may be needed to aid the design and construction of the remedial system. A DQO process, as defined in the IMP, will be employed to establish the decision, and data needs to aid in the construction of the remedial system. The remedial system may consist of a groundwater containment or treatment system, or a source removal action. Components of this step may include:

- Preparation and presentation of design documents and construction workplans
- Preparation and presentation of additional sampling and analysis plans
- Determination of performance monitoring requirements

Development and consideration of alternatives will involve consultation with the groundwater workgroup during key phases of the project.

1.6 VERIFICATION OF THE SELECTED REMEDIAL ACTION

Once a selected remedial action has been implemented, it may be necessary to demonstrate that the action meets the prescribed remediation goals. To verify the adequacy of a remedial action, the performance criteria must be clearly defined. For example, the performance criteria for a source removal remedy would be quite different than the performance criteria for a plume intercept remedy. The effectiveness of the former could be easily demonstrated by a trend showing a reduction with time of contaminant concentrations in and immediately downgradient of the remediated area; whereas the effectiveness of a plume intercept system might be evaluated relative to water quality criteria at a point of compliance. The performance criteria will need to be defined on a case-by-case basis, accounting for the site- and contaminant-specific characteristics of different plumes. Decisions will require consultation of the groundwater working group during key phases of the evaluation, and performance monitoring will be implemented through the IMP process.

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Appendix N

**METHODOLOGY FOR UPDATED ENVIRONMENTAL
RESTORATION RANKING**

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APPENDIX N

METHODOLOGY FOR UPDATED ENVIRONMENTAL RESTORATION RANKING

1.0 FISCAL YEAR 1996 - UPDATE ENVIRONMENTAL RESTORATION RANKING

This document presents the fiscal year 1996 (FY96) update to the methodology presented in the RFCA Attachment 4, which contains the 1995 prioritized list of ER sites developed to select the top priority sites for remediation (DOE, 1995a). The ER ranking was developed to be used as an aid in planning and prioritizing remedial actions at RFETS. The sequence of remediation activities at RFETS has generally followed the prioritization. Other factors that also influence the remediation sequence are funding, project cost, resource availability, data sufficiency, and integration with other remedial and Site activities. Prioritization accelerates the cleanup process of the worst sites first, and more quickly reduces risks to human health and the environment. The prioritization of cleanup targets also results in cost reductions by allowing better planning, and more efficient utilization of resources.

The 1995 prioritization methodology was developed by a working group of the EPA, CDPHE, DOE, Kaiser-Hill, and RMRS staff and was implemented by RMRS. The result was a prioritized list of ER sites, including a list of ranked sites that require more information (DOE, 1995a). In accordance with RFCA Attachment 4, the ranking has been updated during FY96. The evaluation process is essentially the same as was used in the September 1995 ranking, with the following exceptions:

- ALF for Surface Water, Groundwater, and Soils (RFCA Attachment 5) values were used
- The scoring scale was adjusted to reflect the greater range in ALF ratios
- Impact to surface water was evaluated instead of mobility
- A professional judgment factor was added to account for process knowledge
- Groundwater plumes were evaluated and ranked separately from the contaminant source
- The secondary evaluation, which included project cost and schedule estimates, has been omitted due to other planning activities ongoing at the RFETS

1.1 METHODOLOGY

The ranking process detailed in RFCA Attachment 4 was slightly modified in 1996 to incorporate the ALF and process knowledge. This ranking was generated by using concentrations of contaminants present at different sites, action levels for the appropriate media and location, and factors for impact to surface water, potential for further release, and professional judgment to develop a score for each site. The scores were then ranked to determine which sites have the highest priority. This methodology is conservative and is used only to generate a list to prioritize remedial actions, and pre-remediation investigations. It is not meant to replace a formal risk assessment.

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Ecological risk was also considered during the ranking. The recently completed ecological risk assessment was considered during evaluation of the Buffer Zone. There is no unacceptable ecological risk from Buffer Zone IHSSs under present conditions and exposure pathways. An ecological risk assessment has not been completed for the Industrial Area. Ecological factors were not considered when ranking IHSSs in this area.

The following steps were used in the 1996 ranking process:

- The existing analytical data were compared to background data
- Data exceeding background were compared to the ALF Tier I and Tier II values
- Ratios of Tier II ALF values to contaminant concentrations/activities were used for the ranking, unless Tier II values were not available
- A column was added to the ranking sheet to note Tier I exceedances
- The resulting ratios were converted to a score of 1 to 10
- The impact to surface water was evaluated, and assigned a factor of 1 to 3
- The potential for further release was evaluated, and a factor of 1 to 3 applied
- Process knowledge of the site was evaluated, and a professional judgment factor of 0.5 to 2 applied
- The results of the previous steps were multiplied to generate a score per site; this score was used to rank the ER sites

Analytical data in the SWD from 1990 to the present were evaluated for three media; surface soils, subsurface soils, and groundwater. The analytical data were extracted from the SWD and compiled into data sets by media and analytical suite. The media-specific analytical data were compared to the media- and chemical-specific background mean plus two standard deviations (M2SD). All data above the background M2SD were then compared to the appropriate Tier I and Tier II ALF values in RFCA. The draft radiological ALF values for surface soils (See Appendix L) were applied to both surface and subsurface soils. The ALF values for metals in subsurface soils were not agreed upon in time to be included in the 1996 ranking and metals data from subsurface soils were not used in the ranking. A review of the data suggests that this will not effect the ranking significantly.

All exceedances of the Tier I and II ALF values were tabulated for groundwater, subsurface soils, and surface soils at each sample location. The locations were plotted on maps using available survey information. Where no survey data is available, approximate locations were derived from work plan maps. The sample locations were assigned to areas-of-concern, IHSSs, and groundwater plumes based on the media, location of the exceedance, and the analyte.

Media Specific Evaluations

Groundwater - Sitewide groundwater data were compared to background M2SD values presented in the 1993 *Background Geochemical Characterization Report* (DOE, 1993a). Groundwater data were then compared to the Tier I and Tier II ALF values. All well locations where a chemical concentration exceeds a Tier I or Tier II ALF value were plotted. The locations were then associated with the most probable source area and known groundwater plumes. Ratios of analyte concentrations to the Tier II ALF values were used in the scoring.

Subsurface Soil - All available subsurface soil data collected since 1990 were compared to subsurface soil background M2SD values (DOE, 1993a). The data for volatile organic compounds were compared to the Tier I ALF values (there are no Tier II values), the radiological activities were compared to the surface soil Tier I and Tier II ALF values. The ALF values for metals in subsurface soils are in ALF. The locations of all borings where a chemical concentration exceeded an ALF value were plotted and associated with the most likely source area.

Surface Soil - All available surface soil data for metals and radiologicals were compared to M2SD background values computed from data presented in the *Geochemical Characterization of Background Surficial Soils, Background Soils Characterization Program, May 1995* (DOE, 1995c). The inorganic and radiological results above background and all data for organic compounds were compared to the Tier I and Tier II ALF values for surface soil. Within the boundaries of the Industrial Area OU, the surface soil data were compared to office worker ALF values. In the Buffer Zone OU, the surface soil data were compared to open space ALF values. The ALF exceedances were plotted to determine the most likely source area, IHSS or group of IHSSs, using the most common wind patterns. Ratios of analyte concentrations to the Tier II ALF values were used in the scoring.

Chemical Score Tabulation

All ALF exceedances were tabulated by IHSS, group of IHSSs, or source area. The chemical score was calculated for each media, within each site, by adding the maximum ratio for each analyte per media. The groundwater, subsurface soil, and surface soil scores were then summed to generate a total score per site. This is a conservative approach that allows the sites to be judged on a uniform basis.

A separate score was derived for each groundwater plume by evaluating only the groundwater exceedances. A risk score was calculated for each plume, as above, by adding the maximum ALF ratios for groundwater contaminants associated with all sites within the estimated plume area. This method results in groundwater being used twice; once in the scoring of sources, and again for the scoring of groundwater plumes. The total chemical scores were graded according to the following table so that the risk component of the ranking system would be weighted similarly to the other components. This table has been adjusted from the 1995 methodology due to the increase in the range of the scores.

Total Chemical Score	ALF Score
>20001	10
10001-20000	9
5001-10000	8
1001-5000	7
501-1000	6
251-500	5
126-250	4
75-125	3
26-75	2
1-25	1

Surface Water Impacts

The impact of contamination at a site on surface water quality was evaluated and each site was assigned a factor of 1 to 3 to indicate the impact on surface water from each site. The impact to surface water factors were assigned on a scale of 1 to 3 as follows:

1. Contaminants that are immobile in the environment or for which there is no pathway to surface water. Radionuclides and metals were given a score of one unless adjacent to surface water, or on a steep slope bordering surface water. This rating was used where engineered structures are in place that prevent the spread of contaminants.
2. This rating was applied where contaminants have or are expected to have an impact on surface water at the Tier II ALF level (MCL).
3. This rating will apply where there is a documented or probable impact to surface water above the Tier I ALF value (100 x MCL).

Potential for Further Release

This factor takes into account the potential for additional release of contaminants into the environment and includes cross-media movement of contaminants within the environment. Sites were assigned a value of 1 to 3 based on the following criteria:

1. Assigned to a location when contamination were not present as free product, very high concentrations, and/or show no cross contamination of environmental media.
2. Any location where free product may be present in the ground and/or where there is a potential for cross contamination.

3. Locations where there is indication or certainty that free product exists in the ground, where significant levels of contamination exist, and/or where cross contamination of environmental media is present.

Professional Judgment

A professional judgment factor was added to the FY97's ranking based on process knowledge not represented by the other factors. The reasons for assigning the professional judgment factor are given in the comment column of the ranking. The values for this factor are:

- 0.5 The ranking overestimates the priority of a site. This was used if a risk assessment or conservative screen has been completed indicating an acceptable risk, but the site ranks high on the priority listing.
- 1 The ranking reflects process knowledge of a site.
- 2 The ranking underestimates the priority of a site. This may be due to a lack of data, coupled with process knowledge of significant releases.

Total Score and Ranking

The total score was calculated by multiplying the ALF score times the impact to surface water, potential for further release, and professional judgment factors. A formal risk assessment is a more precise evaluation of the same data, and, where risk assessment data exist, they were used to refine the ranking of the sites through the use of the professional judgment factor.

Where insufficient data currently exist to rank sites, these sites were assigned to the category of needs further investigation (INV) and ranked using the professional judgment factor. This placed them on the ranking above known low-risk sites. As data become available, the ranking for these sites will be updated.

The Solar Ponds groundwater score was calculated without using data from an upgradient well which shows the effects of an upgradient plume. Instead, this well was used in the calculations for the groundwater score for IHSS 118.1 and the carbon tetrachloride spill plume.

Where analytical data and process knowledge indicate that there are localized areas of contamination, the associated data were eliminated from site evaluation, and assigned to a hot spot list. These sites will be evaluated to verify that these are hot spots. Most of the localized extent sites are PCB sites, including a PCB site in IHSS 150.6 and those surrounding Bowman's Pond. The Old Landfill has analytical data indicating the presence of small radiological anomalies at the surface. Best management practices will be used on these hot spots as part of the final remedy for the Old Landfill.

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Radium 226 and 228 data were not evaluated for the following reasons:

- Radium 226 and 228 are not listed as having been used at RFETS in either the *Historical Release Report* (DOE, 1992a) or the *Project Task 3/4 Report: Reconstruction of Historical Rocky Flats Operations and Identification of Release Points* (ChemRisk, 1992)
- The decay chains and half-lives of decay products make it highly unlikely that significant amounts of radium 226 or 228 would have accumulated by radioactive decay of radionuclides known to have been used at RFETS
- The soils and groundwater in the foothills to the west of RFETS are known to have high levels of both uranium (total) and radium 226
- The background amount for radium 226 in surface soil has a PPRG ratio of 48. Therefore, any surface soil analytical result above background would skew the prioritization score to a higher result. This is not justified given the information on usage and natural occurrence

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Appendix O

EXAMPLE OF HISTORICAL RELEASE REPORT UPDATE

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APPENDIX O

1.0 EXAMPLE OF HISTORICAL RELEASE REPORT UPDATE

PAC REFERENCE NUMBER: NW-195

IHSS Reference Number: 195, Operable Unit 16
Unit Name: Nickel Carbonyl Disposal
Approximate Location: N754,500; E2,083,000

Date(s) of Operation or Occurrence

March through August 1972

Description of Operation or Occurrence

From March through August 1972, cylinders of nickel carbonyl were disposed in a dry well located in the buffer zone. The cylinders were opened inside the well and vented with small arms fire to allow decomposition in air (DOE 1994b).

Physical/Chemical Description of Constituents Released

Nickel carbonyl vapors are denser than air. Consequently, the vapors collected and decomposed in the bottom of the well. Because these vapors ignite spontaneously, ignition occurred either immediately after release into the well or sometime after collection at the bottom of the well (DOE 1992a, 1992b).

Response to Operation or Occurrence

After 24 hours of placement in the well, the cylinders were removed from the hole, vented by small arms fire, and buried in the Present Landfill. Two cylinders became stuck in the hole and were buried in place. A minimal amount of nickel carbonyl was probably released to the atmosphere during disposal. Samples (presumably of air) from the lip of the well taken after the initial disposal indicated nickel carbonyl concentrations of approximately 10 parts per million being released during disposal (DOE 1992a, 1992b). This IHSS was then studied in accordance with the IAG as part of OU 16 (DOE 1992b).

Fate of Constituents Released to the Environment

Nickel carbonyl is highly volatile and readily decomposes in the presence of oxygen, forming nickel oxide. Nickel oxide is highly insoluble in groundwater. For every gram (0.002 pound) of nickel oxide in contact with typical groundwater, approximately 10-26 microgram of

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nickel per liter is transferred to solution. Wind dispersion subsequently disseminated the nickel oxide particles, which therefore would not be detected at concentrations exceeding background. IHSS 195 does not pose a risk to human health and the environment because there are no viable transport pathways.

Action/No Action Recommendation

Based on information presented in the *Final No Further Action Justification Document for Operable Unit 16, Low-Priority Sites* (DOE 1992b), a CAD/ROD recommending no action under CERCLA for IHSS 195 was prepared, and received final approval on October 28, 1994 (see attached declaration).

Comments

None.

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Appendix P

**PROGRAMMATIC PRELIMINARY REMEDIATION
GOALS**

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1.0 INTRODUCTION

DOE developed risk-based PPRGs in 1995 to establish initial site-wide cleanup targets for contaminants for each environmental medium. The PPRGs are currently used in RFCA Attachment 5, as action levels for the following mediums:

- Groundwater Action Levels: PPRGs based on residential groundwater ingestion scenario are used where no Maximum Contaminant Level (MCL) is available from EPA;
- Surface Soil Action Levels: For non-radionuclides, PPRGs are used as action levels for the appropriate land use, e.g., industrial use or open space use; and
- Subsurface Soil Action Levels: For non-radionuclide inorganics, PPRGs are used as action levels for the appropriate land use, e.g., industrial use or open space use.

PPRGs are reviewed and updated, as necessary, on an annual basis.

2.0 EXPOSURE PATHWAYS

In order to standardize the risk-based PPRGs across RFETS, programmatic exposure pathways and receptors were established. The following tables identify the receptors and exposure pathways selected for each environmental medium:

- Table 1: Residential Groundwater Exposure Scenario
- Table 2: Office Worker Surface Soil Exposure Scenario
- Table 3: Open Space Surface Water Exposure Scenario
- Table 4: Open Space Surface Soil Exposure Scenario

Standard assumptions given in Risk Assessment Guidance for Superfund (RAGS), Part B (USEPA, 1991) were used in developing risk-based PPRG pathways where available. For situations not addressed by RAGS, Part B, standard assumptions given in RAGS, Part A (USEPA, 1989) were used. In addition, site-specific information was used where appropriate to supplement assumptions given in EPA guidance. Best professional judgement was applied when default values differed from site-specific information.

In addition to EPA and site-specific information, CDPHE guidance (*Interim Final Policy and Guidance on Risk Assessments for Corrective Action at RCRA Facilities*) was consulted for exposure pathways and parameters. While this guidance has not been finalized, it was reviewed and CDPHE was consulted on its use during development of the risk-based PPRG pathways.

3.0 METHODOLOGY, EQUATIONS, AND ASSUMPTIONS

Risk-based PPRGs were developed for all Target Analyte List metals, Target Compound List organics and 13 radionuclides for the residential groundwater exposure scenario; the office worker surface soil exposure scenario; the open space surface water exposure scenario; and the open space surface soil exposure scenario. Separate risk-based equations were developed to account for the carcinogenic, noncarcinogenic, and/or radiological effects of the contaminant. Risk-based PPRGs for carcinogens (including radionuclides) were calculated by setting the carcinogenic target risk level at 10^{-6} . A target risk level of 10^{-6} means that an individual has a one-in-one million probability of developing cancer over a lifetime as a result of exposure to a specific contaminant. This risk is in addition to the probability of an individual developing cancer from some other factors such as those associated with heredity or lifestyle. Similarly, risk-based PPRGs for toxicants (noncarcinogens) were calculated by setting the hazard quotient equal to 1 for each contaminant. A hazard quotient is the ratio of a single substance exposure level of a chemical contaminant over a specified period to the reference dose for the chemical. The reference dose represents an estimate of an exposure level for the human population, including sensitive subpopulations that is likely to be without appreciable deleterious effects during a lifetime. For some of the contaminants both carcinogenic and noncarcinogenic toxicity information was available. For these contaminants, both a carcinogenic and noncarcinogenic risk-based concentration was calculated and the more restrictive value was selected as the risk-based PPRG. The risk-based equations for radiological effects were used to calculate the risk-based PPRGs for the 13 radionuclides.

The risk-based PPRG exposure scenarios and equations provided in Tables 1 through 4 include all of the exposure pathways (e.g., direct ingestion of soils) identified for the exposure scenario; separate risk-based PPRGs were not calculated for each exposure pathway.

4.0 CHEMICAL TOXICITY INFORMATION

The chemical-specific toxicity values used for the calculation of the risk-based PPRGs are presented in Table 5. The toxicity information used to calculate the risk-based PPRGs included the slope factor and unit risk for evaluating carcinogenic effects; the reference dose (RfD); and the reference concentration (RfC) for evaluating noncarcinogenic effects. Toxicity values were obtained from the latest information in EPA's Integrated Risk Information System (IRIS) files and the 1997 EPA Health Effects Assessment Summary Tables. Values for polycyclic aromatic hydrocarbons were calculated using EPA's Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons.

5.0 RFETS PPRGs

Table 6 is a summary of the PPRGs for each exposure scenario.

Table 1 - Residential Exposure Scenario RFETS PPRGs

The **Residential Groundwater Exposure Scenario** consists of the following pathway: ingestion of groundwater (which includes radiation exposure while ingesting groundwater) for an adult resident living at the site for 30 years. This scenario includes only pathways that were evaluated in the Rocky Flats Cleanup Agreement (RFCA) to derive action levels.

Exposure Parameter	Variable	Unit	Value	Source
General Assumptions				
Target hazard index	THI	--	1	EPA, 1991a
Target excess lifetime cancer risk	TR	--	1E-06	EPA, 1991a
Adult body weight	BW	kg	70	EPA, 1991b
Residential Exposure Scenario Assumptions				
Averaging time - noncarcinogenic	AT_NC	yr	30	EPA, 1991b
Averaging time - carcinogenic	AT_C	yr	70	EPA, 1991b
Exposure frequency	EF	day/yr	350	EPA, 1991b
Exposure duration	ED	yr	30	EPA, 1991b
Daily water ingestion rate	IRw	L/day	2	EPA, 1991b
Toxicity Values				
Oral reference dose	RfDo	mg/kg-day	chemical-specific	--
Oral slope factor	SFo	(mg/kg-day) ⁻¹	chemical-specific	--
Ingestion slope factor - radiological effects	SFo _{RAD}	risk/pCi	chemical-specific	--
Risk-Based PPRG				

Residential Groundwater Exposure Scenario-Noncarcinogenic Effects

$$\text{PPRG (mg/L)} = (\text{THI} \times \text{BW} \times \text{AT_NC} \times 365\text{d/yr}) / (\text{EF} \times \text{ED} \times \text{IRw} \times 1/\text{RfDo})$$

Residential Groundwater Exposure Scenario-Carcinogenic Effects

$$\text{PPRG (mg/L)} = (\text{TR} \times \text{BW} \times \text{AT_C} \times 365\text{d/yr}) / (\text{EF} \times \text{ED} \times \text{IRw} \times \text{SFo})$$

Residential Groundwater Exposure Scenario-Radiological Effects

$$\text{PPRG (pCi/L)} = \text{TR} / (\text{EF} \times \text{ED} \times \text{IRw} \times \text{SFo}_{\text{RAD}})$$

Notes:

-- Not applicable

Sources:

EPA, 1991a = U.S. Environmental Protection Agency. 1991. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part B, Development of Risk-Based Preliminary Remediation Goals. Interim. Office of Emergency and Remedial Response, Washington, D.C. Publication 9285.7-01B. December.

EPA, 1991b = U.S. Environmental Protection Agency. 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.6-03. March 25.

Table 2 - Office Worker Exposure Scenario RFETS PPRGs

The Office Worker Surface Soil Exposure Scenario consists of the following pathways: incidental ingestion of surface soil and indoor inhalation of surface soil particulates for an adult office worker at the site for 25 years. This scenario includes only pathways that were evaluated in the Rocky Flats Cleanup Agreement (RFCA) to derive action levels.

Exposure Parameter	Variable	Unit	Value	Source
General Assumptions				
Target hazard index	THI	--	1	EPA, 1991a
Target excess lifetime cancer risk	TR	--	1E-06	EPA, 1991a
Adult body weight	BW	kg	70	EPA, 1991b
Office Worker Exposure Scenario Assumptions				
Averaging time - noncarcinogenic	AT_NC	yr	25	EPA, 1991b
Averaging time - carcinogenic	AT_C	yr	70	EPA, 1991b
Exposure frequency	EF	day/yr	250	EPA, 1991b
Exposure duration	ED	yr	25	EPA, 1991b
Daily indoor inhalation rate	IRa	m ³ /day	8.8	ICRP 66, 1993
Particulate Emission Factor	PEF	m ³ /kg	1.32E+09	EPA, 1996
Soil ingestion rate	IRs	mg/day	50	EPA, 1991b
Gamma shielding factor	Se	--	0.2	EPA, 1991a
Gamma exposure factor (annual) = (EF / 365 day/yr) [a]	Te_A	--	6.85E-01	EPA, 1991a
Gamma exposure factor (daily) = (8 hr/day / 24 hr/day)	Te_D	--	3.33E-01	EPA, 1991a
Toxicity Values				
Oral reference dose	RfDo	mg/kg-day	chemical-specific	--
Oral slope factor	SFo	(mg/kg-day) ⁻¹	chemical-specific	--
Ingestion slope factor - radiological effects	SFo _{RAD}	risk/pCi	chemical-specific	--
Inhalation reference dose	RfDi	mg/kg-day	chemical-specific	--
Inhalation slope factor	SFi	(mg/kg-day) ⁻¹	chemical-specific	--
Inhalation slope factor - radiological effects	SFi _{RAD}	risk/pCi	chemical-specific	--
External exposure slope factor	SFe	(risk/yr per pCi/g)	chemical-specific	--
Risk-Based PPRG				
Office Worker Surface Soil Exposure Scenario-Noncarcinogenic Effects				
PPRG (mg/kg) = (THI x BW x AT_NC x 365d/yr)/(EF x ED x ((1/PEF x IRa x 1/RfDi) + (1E-06 kg/mg x IRs x 1/RfDo)))				
Office Worker Surface Soil Exposure Scenario-Carcinogenic Effects				
PPRG (mg/kg) = (TR x BW x AT_C x 365d/yr)/(EF x ED x ((1/PEF x IRa x SFi) + (1E-06 kg/mg x IRs x SFo)))				
Office Worker Surface Soil Exposure Scenario-Radiological Effects				
PPRG (pCi/g) = TR / [ED x ((EF x 1/PEF x 10 ³ g/kg x IRa x SFi _{RAD}) + (EF x 1E-03 g/mg x IRs x SFo _{RAD}) + (SFe x (1-Se) x (Te_A x Te_D)))]				

Notes:

-- Not applicable

[a] Extrapolated to calculate annual exposure.

Sources:

EPA, 1991a = U.S. Environmental Protection Agency. 1991. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part B, Development of Risk-Based Preliminary Remediation Goals. Interim. Office of Emergency and Remedial Response, Washington, D.C. Publication 9285.7-01B. December.

EPA, 1991b = U.S. Environmental Protection Agency. 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.6-03. March 25.

EPA, 1996 = U.S. Environmental Protection Agency. 1996. Soil Screening Guidance: Technical Background Document. Office of Emergency and Remedial Response, Washington, D.C. EPA/540/R-95/128. May.

ICRP 66, 1993 = International Commission on Radiological Protection (ICRP). 1993. Human Respiratory Tract Model for Radiological Protection. ICRP Publication 66.

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Table 3 - Open Space Surface Water Exposure Scenario RFETS PPRGs

The Open Space Surface Water Exposure Scenario consists of the following pathway: incidental ingestion of surface water for an open space visitor who recreates at the site for 30 years. The open space receptor visits the site 100 times per year. This scenario includes only pathways that were evaluated in the Rocky Flats Cleanup Agreement (RFCA) to derive action levels.

Exposure Parameter	Variable	Unit	Value	Source
General Assumptions				
Target hazard index	THI	--	1	EPA, 1991a
Target excess lifetime cancer risk	TR	--	1E-06	EPA, 1991a
Adult body weight	BW	kg	70	EPA, 1991b
Open Space Exposure Scenario Assumptions				
Averaging time - noncarcinogenic	AT_NC	yr	30	EPA, 1991b
Averaging time - carcinogenic	AT_C	yr	70	EPA, 1991b
Contact rate	CR	L/hr	0.05	(1)
Exposure time	ET	hr/day	1	(2)
Exposure frequency	EF	day/yr	100	JeffCo, 1996
Exposure duration	ED	yr	30	EPA, 1991b
Toxicity Values				
Oral reference dose	RfDo	mg/kg-day	chemical-specifi	--
Oral slope factor	SFo	(mg/kg-day) ⁻¹	chemical-specifi	--
Ingestion slope factor - radiological effects	SFo _{RAD}	risk/pCi	chemical-specifi	--

Risk-Based PPRG**Open Space Surface Water Exposure Scenario-Noncarcinogenic**

$$\text{PPRG}(\text{mg/L}) = \{\text{THI} \times \text{BW} \times \text{AT_NC} \times 365 \text{ d/yr}\} / \{\text{CR} \times \text{ET} \times \text{EF} \times \text{ED} \times 1/\text{RfDo}\}$$

Open Space Surface Water Exposure Scenario-Carcinogenic

$$\text{PPRG}(\text{mg/L}) = \{\text{TR} \times \text{BW} \times \text{AT_C} \times 365 \text{ d/yr}\} / \{\text{CR} \times \text{ET} \times \text{EF} \times \text{ED} \times \text{SFo}\}$$

Open Space Surface Water Exposure Scenario-Radiological Effects

$$\text{PPRG}(\text{pCi/L}) = \{\text{TR}\} / \{\text{CR} \times \text{ET} \times \text{EF} \times \text{ED} \times \text{SFo}_{\text{RAD}}\}$$

Sources:

(1) Ingestion Rate based upon open-space recreational user wading at Denver's Lowry Landfill Superfund Site (50 mL/day, RME; 25 mL/day, CT). For comparison, a single value of 35 mL/day is specified for DOE's Fernald Site (wading in shallow Paddy's Run).

(2) Exposure Time based upon DOE's Fernald Site recreational use (0.5 hr/day, CT) and on the Clear Creek/Central City Superfund Site recreational user (1.0 hr/day, RME, assuming that wading time would be the same as swimming time).

EPA, 1991a = U.S. Environmental Protection Agency. 1991. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part B, Development of Risk-Based Preliminary Remediation Goals. Interim. Office of Emergency and Remedial Response, Washington, D.C. Publication 9285.7-01B. December.

EPA, 1991b = U.S. Environmental Protection Agency. 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.6-03. March 25.

JeffCo, 1996 = Jefferson County Parks and Open Space Study. Jefferson County, CO. 1996.

Table 4 - Open Space Surface Soil Exposure Scenario RFETS PPRGs

The Open Space Surface Soil Exposure Scenario consists of the following pathways: inhalation of surface soil particulates and incidental ingestion of surface soil for an open space visitor who recreates at the site for 30 years including six years as a child. The open space receptor visits the site 100 times per year. This scenario includes only pathways that were evaluated in the Rocky Flats Cleanup Agreement (RFCA) to derive action levels.

Exposure Parameter	Variable	Unit	Value	Source
General Assumptions				
Target hazard index	THI	-	1	EPA, 1991a
Target excess lifetime cancer risk	TR	-	1E-06	EPA, 1991a
Adult body weight	BW	kg	70	EPA, 1991b
Child body weight	BWc	kg	15	EPA, 1991b
Open Space Exposure Scenario Assumptions				
Averaging time - noncarcinogenic	AT_NC	yr	30	EPA, 1991b
Averaging time - carcinogenic	AT_C	yr	70	EPA, 1991b
Exposure time	ET	hr/day	2.5	JeffCo, 1996
Exposure frequency	EF	day/yr	100	JeffCo, 1996
Exposure duration (adult and child, combined)	ED	yr	30	EPA, 1991b
Exposure duration (adult)	EDa	yr	24	EPA, 1991b
Exposure duration (child)	EDc	yr	6	EPA, 1991b
Inhalation rate	IRa_h	m ³ /hr	1.7	EPA, 1997; JeffCo, 1996
Inhalation rate = [IRa_h x ET]	IRa	m ³ /day	4.25	Calculated
Particulate Emission Factor	PEF	m ³ /kg	1.32E+09	EPA, 1996
Soil ingestion rate (adult)	IRs_a	mg/day	50	EPA, 1995
Soil ingestion rate (child)	IRs_c	mg/day	100	(1)
Age-adjusted soil ingestion factor = [(IRs_a x EDa) / BW] + [(IRs_c x EDc) / BWc]	IFs	mg-yr/kg-day	57	EPA, 1991a
Age-adjusted soil ingestion factor - radiation = (IRs_a x EDa) + (IRs_c x EDc)	IFs_RAD	mg-yr/day	1,800	EPA, 1991a
Gamma shielding factor	Se	-	0	EPA, 1991a
Gamma exposure factor (annual) = (EF / 365 day/yr) [a]	Te_A	-	2.74E-01	EPA, 1991a; JeffCo, 1996
Gamma exposure factor (daily) = (ET / 24 hr/day)	Te_D	-	1.04E-01	EPA, 1991a; JeffCo, 1996
Toxicity Values				
Oral reference dose	RfDo	mg/kg-day	chemical-specific	-
Oral slope factor	SFo	(mg/kg-day) ⁻¹	chemical-specific	-
Ingestion slope factor - radiological effects	SForAD	risk/pCi	chemical-specific	-
Inhalation reference dose	RfDi	mg/kg-day	chemical-specific	-
Inhalation slope factor	SFi	(mg/kg-day) ⁻¹	chemical-specific	-
Inhalation slope factor - radiological effects	SFiRAD	risk/pCi	chemical-specific	-
External exposure slope factor	SFe	(risk/yr per pCi/g)	chemical-specific	-

Risk-Based PPRG**Open Space Surface Soil Exposure Scenario-Noncarcinogenic Effects**

$$\text{PPRG (mg/kg)} = (\text{THI} \times \text{AT_NC} \times 365 \text{ d/yr}) / (\text{EF} \times ((\text{IRa} \times \text{ED} \times 1/\text{RfDi} \times 1/\text{BW} \times 1/\text{PEF}) + (1/\text{RfDo} \times 1\text{E-}06 \text{ kg/mg} \times \text{IFs})))$$

Open Space Surface Soil Exposure Scenario-Carcinogenic Effects

$$\text{PPRG (mg/kg)} = (\text{TR} \times \text{AT_C} \times 365 \text{ d/yr}) / \text{EF} \times ((\text{SFi} \times \text{IRa} \times \text{ED} \times 1/\text{BW} \times 1/\text{PEF}) + (1\text{E-}06 \text{ kg/mg} \times \text{IFs} \times \text{SFo}))$$

Open Space Surface Soil Exposure Scenario-Radiological Effects

$$\text{PPRG (pCi/g)} = \text{TR} / ((\text{ED} \times \text{EF} \times \text{IRa} \times \text{SFiRAD} \times 10^3 \text{ g/kg} \times 1/\text{PEF}) + (\text{EF} \times \text{SForAD} \times 1\text{E-}03 \text{ g/mg} \times \text{IFs_RAD}) + (\text{ED} \times \text{SFe} \times (1-\text{Se}) \times (\text{Te_A} \times \text{Te_D})))$$

Notes:

[a] Extrapolated to calculate annual exposure.

Sources:

(1) Based on the assumption that outdoor ingestion of soil accounts for one-half the daily residential intake (200 mg/day for children, as cited in EPA (1991b)).

EPA, 1991a = U.S. Environmental Protection Agency. 1991. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Part B. Development of Risk-Based Preliminary Remediation Goals. Interim. Office of Emergency and Remedial Response, Washington, D.C. Publication 9285.7-01B. December.

EPA, 1991b = U.S. Environmental Protection Agency. 1991. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Office of Solid Waste and Emergency Response, Washington, D.C. OSWER Directive 9285.6-03. March 25.

EPA, 1995 = U.S. Environmental Protection Agency. Baseline Human Health Risk Assessment for the California Gulch Superfund Site. Part C. Screening-level Soil Concentrations for Workers and Recreational Site Visitors Exposed to Lead and Arsenic. February. Prepared for EPA Region VIII, Denver, CO by Roy F. Weston, Inc.

EPA, 1996 = U.S. Environmental Protection Agency. 1996. Soil Screening Guidance: Technical Background Document. Office of Emergency and Remedial Response, Washington, D.C. EPA/540/R-95/128. May.

EPA, 1997 = U.S. Environmental Protection Agency. 1997. Exposure Factors Handbook. Office of Research and Development, Washington, D.C. EPA/600/P-95/002Fa. August.

JeffCo, 1996 = Jefferson County Parks and Open Space Study. Jefferson County, CO. 1996.

Table 5 - Toxicity Values used for the RFETS PPRGs [a]

Target Analyte List Chemical	CAS Number	Oral RfD (mg/kg-day)	Oral/Ingestion Slope Factor (mg/kg-day) ⁻¹	Inhal RfC (mg/m ³)	Inhalation Unit Risk (m ³ /μg)	Inhalation RfD (mg/kg-day)	Inhalation Slope Factor (mg/kg-day) ⁻¹	External Slope Fac (risk/yr per
Acenaphthene (V)	83-32-9	6.00E-02						
Acenaphthylene (V)	208-96-8							
Acetone (V)	67-64-1	1.00E-01						
Aldrin	309-00-2	3.00E-05	1.70E+01		4.90E-03		1.70E+01 b	
Aluminum	7429-90-5	1.00E+00 y				1.00E-03 y		
Anthracene (V)	120-12-7	3.00E-01						
Antimony	7440-36-0	4.00E-04						
Aroclor 1016	12674-11-2	7.00E-05	2.00E+00 c,q		5.70E-04 c,q		2.00E+00 c,q	
Aroclor 1221	11104-28-2		2.00E+00 c,q		5.70E-04 c,q		2.00E+00 c,q	
Aroclor 1232	11141-16-5		2.00E+00 c,q		5.70E-04 c,q		2.00E+00 c,q	
Aroclor 1242	53469-21-9		2.00E+00 c,q		5.70E-04 c,q		2.00E+00 c,q	
Aroclor 1248	12672-29-6		2.00E+00 c,q		5.70E-04 c,q		2.00E+00 c,q	
Aroclor 1254	11097-69-1	2.00E-05	2.00E+00 c,q		5.70E-04 c,q		2.00E+00 c,q	
Aroclor 1260	11096-82-5		2.00E+00 c,q		5.70E-04 c,q		2.00E+00 c,q	
Arsenic	7440-38-2	3.00E-04	1.50E+00 i		4.30E-03		1.51E+01	
Barium	7440-39-3	7.00E-02		5.00E-04 b		1.43E-04 b		
Benzene (V)	71-43-2		2.90E-02		8.30E-06		2.90E-02	
alpha-BHC	319-84-6		6.30E+00		1.80E-03		6.30E+00	
beta-BHC	319-85-7		1.80E+00		5.30E-04		1.86E+00	
delta-BHC	319-86-8							
gamma-BHC (Lindane)	58-89-9	3.00E-04	1.30E+00 b					
Benzo(a)anthracene	56-55-3		7.30E-01 k				3.10E-01 y	
Benzo(a)pyrene	50-32-8		7.30E+00				3.10E+00 y	
Benzo(b)fluoranthene	205-99-2		7.30E-01 k				3.10E-01 y	
Benzo(g,h,i)perylene	191-24-2							
Benzo(k)fluoranthene	207-08-9		7.30E-02 k					
Benzoic Acid	65-85-0	4.00E+00						
Benzyl Alcohol	100-51-6	3.00E-01 b						
Beryllium	7440-41-7	2.00E-03	4.30E+00 w	2.00E-05	2.40E-03	5.71E-06	8.40E+00 b	
bis(2-chloroethoxy)methane (V)	111-91-1							
bis(2-chloroethyl)ether (V)	111-44-4		1.10E+00		3.30E-04		1.10E+00 b	
bis(2-chloroisopropyl)ether (V)	39638-32-9	4.00E-02	7.00E-02 b,u		1.00E-05 b,u		3.50E-02 b,u	
bis(2-ethylhexyl)phthalate	117-81-7	2.00E-02	1.40E-02				1.40E-02 y	
Bromodichloromethane (V)	75-27-4	2.00E-02	6.20E-02					
Bromoform (V)	75-25-2	2.00E-02	7.9E-03		1.10E-06		3.90E-03	
Bromomethane (V)	74-83-9	1.40E-03		5.00E-03		1.43E-03		
4-Bromophenyl phenyl ether	101-55-3							
2-Butanone (V)	78-93-3	6.00E-01		1.00E+00		2.86E-01		
Butylbenzylphthalate	85-68-7	2.00E-01						
Cadmium (water)	7440-43-9	5.00E-04			1.80E-03	5.71E-05 w,y	6.30E+00	
Cadmium (food)	7440-43-9	1.00E-03			1.80E-03	5.71E-05 w,y	6.30E+00	
Calcium	7440-70-2							
Carbon disulfide (V)	75-15-0	1.00E-01		7.00E-01		2.00E-01		
Carbon tetrachloride (V)	56-23-5	7.00E-04	1.30E-01		1.50E-05	5.71E-04 y	5.25E-02	
Cesium	7440-46-2							
alpha-Chlordane	5103-71-9	5.00E-04 d	3.50E-01 d	7.00E-04 d	1.00E-04 d	2.00E-04 d	3.50E-01 d	
beta-Chlordane	5103-74-2	5.00E-04 d	3.50E-01 d	7.00E-04 d	1.00E-04 d	2.00E-04 d	3.50E-01 d	
gamma-Chlordane	12789-03-6	5.00E-04	3.50E-01	7.00E-04	1.00E-04	2.00E-04	3.50E-01	
4-Chloroaniline	106-47-8	4.00E-03						
Chlorobenzene (V)	108-90-7	2.00E-02		2.00E-02 b		5.71E-03 b		
Chloroethane (V)	75-00-3	4.00E-01 y	2.90E-03 y	1.00E+01		2.86E+00		
Chloroform (V)	67-66-3	1.00E-02	6.10E-03		2.30E-05		8.05E-02	
Chloromethane (V)	74-87-3		1.30E-02 b		1.80E-06 b		6.30E-03 b	
4-Chloro-3-methylphenol	59-50-7							
2-Chloronaphthalene (V)	91-58-7	8.00E-02						
2-Chlorophenol (V)	95-57-8	5.00E-03						
4-Chlorophenyl phenyl ether	7005-72-3							
Chromium III	16505-83-1	1.00E+00				5.71E-07 w,y		
Chromium VI	10101-29-9	5.00E-03			1.20E-02		4.20E+01	

Table 5 - Toxicity Values used for the RFETS PPRGs [a]

Target Analyte List Chemical	CAS Number	Oral RfD (mg/kg-day)	Oral/Ingestion Slope Factor (mg/kg-day) ⁻¹	Inhal RIC (mg/m ³)	Inhalation Unit Risk (m ³ /μg)	Inhalation RfD (mg/kg-day)	Inhalation Slope Factor (mg/kg-day) ⁻¹	External Slope Fac (risk/yr per
Chrysene	218-01-9		7.30E-03 k				3.10E-03 y	
Cobalt	7440-48-4	6.00E-02 y						
Copper	7440-50-8	3.70E-02 w.o						
Cyanide	57-12-5	2.00E-02						
4,4-DDD	72-54-8		2.40E-01					
4,4-DDE	72-55-9		3.40E-01					
4,4-DDT	50-29-3	5.00E-04	3.40E-01		9.70E-05		3.40E-01	
Dibenz(a,h)anthracene	53-70-3		7.30E+00 k				3.10E+00 y	
Dibenzofuran	132-64-9	4.00E-03 y						
Dibromochloromethane	124-48-1	2.00E-02	8.40E-02					
Di-n-butylphthalate	84-74-2	1.00E-01						
1,2-Dichlorobenzene (V)	95-50-1	9.00E-02		2.00E-01 b		4.00E-02		
1,3-Dichlorobenzene (V)	541-73-1							
1,4-Dichlorobenzene (V)	106-46-7		2.40E-02 b	8.00E-01		2.30E-01		
3,3-Dichlorobenzidine	91-94-1		4.50E-01					
1,1-Dichloroethane (V)	75-34-3	1.00E-01 b		5.00E-01 b		1.43E-01		
1,2-Dichloroethane (V)	107-06-2	3.00E-02 y	9.10E-02		2.60E-05	1.40E-03 y	9.10E-02	
1,1-Dichloroethene (V)	75-35-4	9.00E-03	6.00E-01		5.00E-05		1.75E-01	
1,2-Dichloroethene (total) (V)	540-59-0	9.00E-03 b						
2,4-Dichlorophenol	120-83-2	3.00E-03						
1,2-Dichloropropane (V)	78-87-5		6.80E-02 b	4.00E-03		1.14E-03		
cis-1,3-Dichloropropene (V)	10061-01-5	3.00E-04 e	1.80E-01 b,e	2.00E-02 e	3.70E-05 b,e	5.71E-03 e	1.30E-01 b,e	
trans-1,3-Dichloropropene (V)	10061-02-6	3.00E-04 e	1.80E-01 b,e	2.00E-02 e	3.70E-05 b,e	5.71E-03 e	1.30E-01 b,e	
Dieldrin	60-57-1	5.00E-05	1.60E+01		4.60E-03		1.60E+01	
Diethylphthalate	84-66-2	8.00E-01						
2,4-Dimethylphenol (V)	105-67-9	2.00E-02						
Dimethylphthalate	131-11-3	1.00E+01 w.y						
4,6-Dinitro-2-methylphenol (V)	534-52-1	1.00E-04 y						
2,4-Dinitrophenol	51-28-5	2.00E-03						
2,4-Dinitrotoluene	121-14-2	2.00E-03	6.80E-01					
2,6-Dinitrotoluene	606-20-2	1.00E-03 b	6.80E-01					
Di-n-octylphthalate	117-84-0	2.00E-02 b						
Endosulfan I	959-98-8	6.00E-03 z						
Endosulfan II	33213-65-9	8.00E-03 z						
Endosulfan sulfate	1031-07-8	6.00E-03 z						
Endosulfan (technical)	115-29-7	6.00E-03						
Endrin ketone	53494-70-5							
Endrin (technical)	72-20-8	3.00E-04						
Ethylbenzene (V)	100-41-4	1.00E-01		1.00E+00		2.86E-01		
Fluoranthene	206-44-0	4.00E-02						
Fluorene (V)	86-73-7	4.00E-02						
Heptachlor	76-44-8	5.00E-04	4.50E+00		1.30E-03		4.50E+00	
Heptachlor epoxide	1024-57-3	1.30E-05	9.10E+00		2.60E-03		9.10E+00	
Hexachlorobenzene	118-74-1	8.00E-04	1.60E+00		4.60E-04		1.60E+00	
Hexachlorobutadiene	87-68-3	2.00E-04 t	7.80E-02		2.20E-05		7.70E-02	
Hexachlorocyclopentadiene	77-47-4	7.00E-03		7.00E-05 b		2.00E-05 b		
Hexachloroethane	67-72-1	1.00E-03	1.40E-02		4.00E-06		1.40E-02	
2-Hexanone (V)	591-78-6							
Indeno(1,2,3-cd)pyrene	193-39-5		7.30E-01 k				3.10E-01 y	
Iron	7439-89-6	3.00E-01						
Isophorone	78-59-1	2.00E-01	9.50E-04					
Lead	7439-92-1							
Lithium	7439-93-2	2.00E-02 * y						
Magnesium	7439-95-4							
Manganese	7439-96-5	4.70E-02 s		5.00E-05		1.43E-05		
Mercury	7439-97-6	3.00E-04 * y		3.00E-04 b		8.60E-05 j		
Methoxychlor	72-43-5	5.00E-03						
Methylene chloride	75-09-2	5.00E-03	7.50E-03	3.00E+00 b	4.70E-07	8.57E-01	1.65E-03	
2-Methyl-4-chlorophenol	95-77-8	4.00E-02						

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Table 5 - Toxicity Values used for the RFETS PPRGs [a]

Target Analyte List Chemical	CAS Number	Oral RfD (mg/kg-day)	Oral/Ingestion Slope Factor (mg/kg-day) ⁻¹	Inhal RfC (mg/m ³)	Inhalation Unit Risk (m ³ /μg)	Inhalation RfD (mg/kg-day)	Inhalation Slope Factor (mg/kg-day) ⁻¹	External Slope Fac (risk/yr per
4-Methyl-2-pentanone (V)	108-10-1	8.00E-02 b		8.00E-02 b		2.29E-02		
2-Methylphenol	95-48-7	5.00E-02						
4-Methylphenol	106-44-5	5.00E-03 b						
Molybdenum	7439-98-7	5.00E-03						
Naphthalene (V)	91-20-3	4.00E-02 w,y						
Nickel	7440-02-0	2.00E-02						
2-Nitroaniline	88-74-4	6.00E-05 w,y		2.00E-04		5.71E-05		
3-Nitroaniline	99-09-2							
4-Nitroaniline	100-01-6							
Nitrobenzene (V)	98-95-3	5.00E-04		2.00E-03 b		5.70E-04 j		
2-Nitrophenol	88-75-5							
4-Nitrophenol (V)	100-02-7	8.00E-03 y						
n-Nitrosodiphenylamine (V)	86-30-6		4.90E-03					
n-Nitrosodipropylamine	621-64-7		7.00E+00					
Pentachlorophenol	87-86-5	3.00E-02	1.20E-01					
Phenanthrene (V)	85-01-8							
Phenol	108-95-2	6.00E-01						
Potassium	7440-09-7							
Pyrene	129-00-0	3.00E-02						
Selenium	7782-49-2	5.00E-03						
Silver	7440-22-4	5.00E-03						
Sodium	7440-23-5							
Strontium	7440-24-6	6.00E-01						
Stryene (V)	100-42-5	2.00E-01		1.00E+00		2.86E-01		
1,1,2,2-Tetrachloroethane (V)	79-34-5		2.00E-01		5.80E-05		2.00E-01 b	
Tetrachloroethene (V)	127-18-4	1.00E-02	5.20E-02 i		5.80E-07 i		2.03E-03 i	
Thallium	7440-28-0							
Tin	7440-31-5	6.00E-01 b						
Toluene (V)	108-88-3	2.00E-01		4.00E-01		1.14E-01		
Toxaphene	8001-35-2		1.10E+00		3.20E-04		1.10E+00	
1,2,4-Trichlorobenzene (V)	120-82-1	1.00E-02		2.00E-01 b		5.71E-02 j		
1,1,1-Trichloroethane (V)	71-55-6	2.00E-02 y				2.86E-01 w,y		
1,1,2-Trichloroethane (V)	79-00-5	4.00E-03	5.70E-02		1.60E-05		5.60E-02	
Trichloroethene (V)	79-01-6	6.00E-03 y	1.10E-02 w		1.70E-06 i		6.00E-03 i	
2,4,5-Trichlorophenol	95-95-4	1.00E-01						
2,4,6-Trichlorophenol	88-06-2		1.10E-02		3.10E-06		1.00E-02	
Vanadium	7440-62-2	7.00E-03 b						
Vinyl acetate	108-05-4	1.00E+00 b		2.00E-01		5.71E-02		
Vinyl chloride (V)	75-01-4		1.90E+00 b		8.40E-05 b		3.00E-01 b	
Xylene (total) (V)	1330-20-7	2.00E+00						
Zinc	7440-66-6	3.00E-01						
Nitrate	14797-55-8	1.60E+00						
Nitrite	14797-65-0	1.00E-01						
Sulfide	18496-25-8							
Ammonium (as Ammonia)	7664-41-7	9.70E-01 x		1.00E-01		2.86E-02		
Bicarbonate	71-52-3							
Bromide	24959-67-9							
Carbonate	3812-32-6							
Chloride	16887-00-6							
Fluoride (as fluorine)	7782-41-4	6.00E-02						
Orthophosphate	14265-44-2							
Silica (as Si and SiO ₂)	7631-86-9							
Sulfate	14808-79-8							
			(Risk/pCi)				(Risk/pCi)	
Am-241	14596-10-2		3.28E-10 b				3.85E-08 b	4.59E-09 b
Cs-137+D	10045-97-3(+D)		3.16E-11 b				1.91E-11 b	2.09E-06 b
Pu-239	15117-48-3		3.16E-10 b				2.78E-08 b	1.26E-11 b

Table 5 - Toxicity Values used for the RFETS PPRGs [a]

Target Analyte List Chemical	CAS Number	Oral RfD (mg/kg-day)	Oral/Ingestion Slope Factor (mg/kg-day) ¹	Inhal RfC (mg/m ³)	Inhalation Unit Risk (m ³ /μg)	Inhalation RfD (mg/kg-day)	Inhalation Slope Factor (mg/kg-day) ¹	External Slope Fac (risk/yr per
Pu-240	14119-33-6		3.15E-10 b				2.78E-08 b	1.87E-11 b
Ra-226+D	13982-63-3(+D)		2.96E-10 b				2.75E-09 b	6.74E-06 b
Ra-228+D	15262-20-1(+D)		2.48E-10 b				9.94E-10 b	3.28E-06 b
Sr-89	14158-27-1		1.03E-11 b				3.68E-12 b	5.38E-10 b
Sr-90+D	10098-97-2(+D)		5.59E-11 b				6.93E-11 b	0.00E+00 b
Tritium	10028-17-8		7.15E-14 b				9.59E-14 b	0.00E+00 b
U-233	13968-55-3		4.48E-11 b				1.41E-08 b	3.52E-11 b
U-234	13966-29-5		4.44E-11 b				1.40E-08 b	2.14E-11 b
U-235+D	15117-96-1(+D)		4.70E-11 b				1.30E-08 b	2.65E-07 b
U-238+D	7440-61-1(+D)		6.20E-11 b				1.24E-08 b	5.25E-08 b

Notes:

(V) = Chemicals listed are volatile.

a = All toxicity values and notes are from IRIS, 1998 unless otherwise noted. Several inhalation slope factors have

been derived by multiplying the inhalation unit risk from IRIS by a conversion factor of 3500: $[SFi = (Inh \text{ Unit Risk} \times 70 \text{ kg} \times 1,000 \text{ ug/mg}) / 20 \text{ m}^3/\text{d}]$.

Several inhalation reference doses have been derived by multiplying the inhalation reference concentration by a conversion factor of 0.2857: $[RfDi = (RfCi \times 20 \text{ m}^3/\text{d}) / 70 \text{ kg}]$.

Several oral slope factors have been derived by multiplying the drinking water unit risk by a conversion factor of 35,000: $[SFo = (DW \text{ Unit Risk} \times 70 \text{ kg} \times 1,000 \text{ ug/mg}) / 2 \text{ L}]$.

b = Value from HEAST, 1997.

c = Values given are for PCBs.

d = Values given are for chlordane (CAS no. 12789-03-6).

e = Values given are for 1,3-dichloropropene.

i = Value given for arsenic is calculated from an oral unit risk of 5E-05 (L/μg).

j = Values given for chemicals were calculated from HEAST, 1997.

k = Values given for PAHs were found in EPA, 1993.

l = Value given is from an EPA memo from the Office of Research and Development, National Center for Environmental Assessment (NCEA).

o = Value based on the copper drinking water standard of 1.3 mg/L.

q = The upper-bound slope factor for high risk and persistence is recommended by EPA for the oral slope factor of PCB environmental mixtures.

r = Dual oral RfDs available for cadmium. 5E-04 is representative of pathways involving water and 1E-03 is representative of pathways involving food (soil).

s = According to IRIS, 1998, the oral RfD of 0.14 represents total oral intake of manganese. It is recommended that a modifying factor of three be applied (resulting oral RfD = 0.047) if oral RfD is used for assessments involving nondietary exposures (ingesting soil or drinking water).

u = Values given for 70 percent bis(2-chloro-1-methyl ethyl) ether and 30 percent bis(2-chloroisopropyl) ether.

w = Value given has been withdrawn by EPA; greater uncertainty is associated with this toxicity value than values listed in IRIS and HEAST.

x = Ammonia oral RfD specifically related to organoleptic threshold.

y = NCEA (as referenced in EPA, 1997).

z = Values given for Endosulfan (technical).

References:

EPA, 1993 = U.S. Environmental Protection Agency. 1993. Research and Development-Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. Prepared for the Office of Health and Environmental Assessment by the Environmental Criteria and Assessment Office, Office of Health and Environmental Assessment, Cincinnati, OH. Final Draft. ECAO-CIN-842. March.

EPA, 1997 = U.S. Environmental Protection Agency. 1997. Region III Risk-Based Concentration Table. Philadelphia, PA. October 22.

HEAST, 1997 = U.S. Environmental Protection Agency. 1997. Health Effects Assessment Summary Tables, FY-1997 Annual. Office of Solid Waste and Emergency Response, Washington, D.C. EPA/540/R-97/036. July.

IRIS, 1998 = U.S. Environmental Protection Agency. 1998. Integrated Risk Information System. On-line database. Office of Research and Development, Cincinnati, OH.

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Table 6 - Programmatic Preliminary Risk-Based Remediation Goals For RFETS

Target Analyte List Chemical	Residential Groundwater (mg/L or pCi/L)	Office Worker Soil (mg/kg or pCi/g)	Open Space Surface Water (mg/L or pCi/L)	Open Space Soil (mg/kg or pCi/g)
Acenaphthene (V)	2.19E+00	1.23E+05	3.07E+02	1.15E+05
Acenaphthylene (V)	-	-	-	-
Acetone (V)	3.65E+00	2.04E+05	5.11E+02	1.92E+05
Aldrin	5.01E-06	3.37E-01	7.01E-04	2.64E-01
Aluminum	3.65E+01	>1E+06	5.11E+03	>1E+06
Anthracene (V)	1.10E+01	6.13E+05	1.53E+03	5.76E+05
Antimony	1.46E-02	8.18E+02	2.04E+00	7.68E+02
Aroclor 1016	4.26E-05	2.86E+00	5.96E-03	2.24E+00
Aroclor 1221	4.26E-05	2.86E+00	5.96E-03	2.24E+00
Aroclor 1232	4.26E-05	2.86E+00	5.96E-03	2.24E+00
Aroclor 1242	4.26E-05	2.86E+00	5.96E-03	2.24E+00
Aroclor 1248	4.26E-05	2.86E+00	5.96E-03	2.24E+00
Aroclor 1254	4.26E-05	2.86E+00	5.96E-03	2.24E+00
Aroclor 1260	4.26E-05	2.86E+00	5.96E-03	2.24E+00
Arsenic	5.68E-05	3.81E+00	7.95E-03	2.99E+00
Barium	2.56E+00	1.34E+05	3.58E+02	1.33E+05
Benzene (V)	2.94E-03	1.97E+02	4.11E-01	1.55E+02
alpha-BHC	1.35E-05	9.08E-01	1.89E-03	7.11E-01
beta-BHC	4.73E-05	3.18E+00	6.62E-03	2.49E+00
delta-BHC	-	-	-	-
gamma-BHC (Lindane)	6.55E-05	4.40E+00	9.17E-03	3.45E+00
Benzo(a)anthracene	1.17E-04	7.84E+00	1.63E-02	6.14E+00
Benzo(a)pyrene	1.17E-05	7.84E-01	1.63E-03	6.14E-01
Benzo(b)fluoranthene	1.17E-04	7.84E+00	1.63E-02	6.14E+00
Benzo(g,h,i)perylene	-	-	-	-
Benzo(k)fluoranthene	1.17E-03	7.84E+01	1.63E-01	6.14E+01
Benzoic Acid	1.46E+02	>1E+06	2.04E+04	>1E+06
Benzyl Alcohol	1.10E+01	6.13E+05	1.53E+03	5.76E+05
Beryllium	1.98E-05	1.33E+00	2.77E-03	1.04E+00
bis(2-chloroethoxy)methane (V)	-	-	-	-
bis(2-chloroethyl)ether (V)	7.74E-05	5.20E+00	1.08E-02	4.07E+00
bis(2-chloroisopropyl)ether (V)	1.22E-03	8.18E+01	1.70E-01	6.40E+01
bis(2-ethylhexyl)phthalate	6.08E-03	4.09E+02	8.52E-01	3.20E+02
Bromodichloromethane (V)	1.37E-03	9.23E+01	1.92E-01	7.23E+01

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Table 6 - Programmatic Preliminary Risk-Based Remediation Goals For RFETS

Target Analyte List Chemical		Residential Groundwater (mg/L or pCi/L)	Office Worker Soil (mg/kg or pCi/g)	Open Space Surface Water (mg/L or pCi/L)	Open Space Soil (mg/kg or pCi/g)
Bromoform	(V)	1.08E-02	7.24E+02	1.51E+00	5.67E+02
Bromomethane	(V)	5.11E-02	2.86E+03	7.15E+00	2.69E+03
4-Bromophenyl phenyl ether		-	-	-	-
2-Butanone	(V)	2.19E+01	>1E+06	3.07E+03	>1E+06
Butylbenzylphthalate		7.30E+00	4.09E+05	1.02E+03	3.84E+05
Cadmium (water)		1.83E-02	NA	2.56E+00	NA
Cadmium (food)		NA	2.04E+03	5.11E+00	1.92E+03
Calcium		-	-	-	-
Carbon disulfide	(V)	3.65E+00	2.04E+05	5.11E+02	1.92E+05
Carbon tetrachloride	(V)	6.55E-04	4.40E+01	9.17E-02	3.45E+01
Cesium		-	-	-	-
alpha-Chlordane		2.43E-04	1.63E+01	3.41E-02	1.28E+01
beta-Chlordane		2.43E-04	1.63E+01	3.41E-02	1.28E+01
gamma-Chlordane		2.43E-04	1.63E+01	3.41E-02	1.28E+01
4-Chloroaniline		1.46E-01	8.18E+03	2.04E+01	7.68E+03
Chlorobenzene	(V)	7.30E-01	4.09E+04	1.02E+02	3.84E+04
Chloroethane	(V)	2.94E-02	1.97E+03	4.11E+00	1.55E+03
Chloroform	(V)	1.40E-02	9.38E+02	1.95E+00	7.35E+02
Chloromethane	(V)	6.55E-03	4.40E+02	9.17E-01	3.45E+02
4-Chloro-3-methylphenol		-	-	-	-
2-Chloronaphthalene	(V)	2.92E+00	1.64E+05	4.09E+02	1.54E+05
2-Chlorophenol	(V)	1.83E-01	1.02E+04	2.56E+01	9.61E+03
4-Chlorophenyl phenyl ether		-	-	-	-
Chromium III		3.65E+01	8.72E+03	5.11E+03	4.43E+04
Chromium VI		1.83E-01	1.02E+03	2.56E+01	4.41E+03
Chrysene		1.17E-02	7.84E+02	1.63E+00	6.14E+02
Cobalt		2.19E+00	1.23E+05	3.07E+02	1.15E+05
Copper		1.35E+00	7.56E+04	1.89E+02	7.11E+04
Cyanide		7.30E-01	4.09E+04	1.02E+02	3.84E+04
4,4-DDD		3.55E-04	2.38E+01	4.97E-02	1.87E+01
4,4-DDE		2.50E-04	1.68E+01	3.51E-02	1.32E+01
4,4-DDT		2.50E-04	1.68E+01	3.51E-02	1.32E+01
Dibenz(a,h)anthracene		1.17E-05	7.84E-01	1.63E-03	6.14E-01
Dibenzofuran		1.46E-01	8.18E+03	2.04E+01	7.68E+03
Dibromochloromethane		1.01E-03	6.81E+01	1.42E-01	5.34E+01

Table 6 - Programmatic Preliminary Risk-Based Remediation Goals For RFETS

Target Analyte List Chemical	Residential Groundwater (mg/L or pCi/L)	Office Worker Soil (mg/kg or pCi/g)	Open Space Surface Water (mg/L or pCi/L)	Open Space Soil (mg/kg or pCi/g)
Di-n-butylphthalate	3.65E+00	2.04E+05	5.11E+02	1.92E+05
1,2-Dichlorobenzene (V)	3.29E+00	1.84E+05	4.60E+02	1.73E+05
1,3-Dichlorobenzene (V)	-	-	-	-
1,4-Dichlorobenzene (V)	3.55E-03	2.38E+02	4.97E-01	1.87E+02
3,3-Dichlorobenzidine	1.89E-04	1.27E+01	2.65E-02	9.96E+00
1,1-Dichloroethane (V)	3.65E+00	2.04E+05	5.11E+02	1.92E+05
1,2-Dichloroethane (V)	9.36E-04	6.29E+01	1.31E-01	4.93E+01
1,1-Dichloroethene (V)	1.42E-04	9.54E+00	1.99E-02	7.47E+00
1,2-Dichloroethene (total) (V)	3.29E-01	1.84E+04	4.60E+01	1.73E+04
2,4-Dichlorophenol (V)	1.10E-01	6.13E+03	1.53E+01	5.76E+03
1,2-Dichloropropane (V)	1.25E-03	8.42E+01	1.75E-01	6.59E+01
cis-1,3-Dichloropropene (V)	4.73E-04	3.18E+01	6.62E-02	2.49E+01
trans-1,3-Dichloropropene (V)	4.73E-04	3.18E+01	6.62E-02	2.49E+01
Dieldrin	5.32E-06	3.58E-01	7.45E-04	2.80E-01
Diethylphthalate	2.92E+01	>1E+06	4.09E+03	>1E+06
2,4-Dimethylphenol (V)	7.30E-01	4.09E+04	1.02E+02	3.84E+04
Dimethylphthalate	3.65E+02	>1E+06	5.11E+04	>1E+06
4,6-Dinitro-2-methylphenol (V)	3.65E-03	2.04E+02	5.11E-01	1.92E+02
2,4-Dinitrophenol (V)	7.30E-02	4.09E+03	1.02E+01	3.84E+03
2,4-Dinitrotoluene	1.25E-04	8.42E+00	1.75E-02	6.59E+00
2,6-Dinitrotoluene	1.25E-04	8.42E+00	1.75E-02	6.59E+00
Di-n-octylphthalate	7.30E-01	4.09E+04	1.02E+02	3.84E+04
Endosulfan I	2.19E-01	1.23E+04	3.07E+01	1.15E+04
Endosulfan II	2.19E-01	1.23E+04	3.07E+01	1.15E+04
Endosulfan sulfate	2.19E-01	1.23E+04	3.07E+01	1.15E+04
Endosulfan (technical)	2.19E-01	1.23E+04	3.07E+01	1.15E+04
Endrin ketone	-	-	-	-
Endrin (technical)	1.10E-02	6.13E+02	1.53E+00	5.76E+02
Ethylbenzene (V)	3.65E+00	2.04E+05	5.11E+02	1.92E+05
Fluoranthene	1.46E+00	8.18E+04	2.04E+02	7.68E+04
Fluorene (V)	1.46E+00	8.18E+04	2.04E+02	7.68E+04
Heptachlor	1.89E-05	1.27E+00	2.65E-03	9.96E-01
Heptachlor epoxide	9.36E-06	6.29E-01	1.31E-03	4.93E-01
Hexachlorobenzene	5.32E-05	3.58E+00	7.45E-03	2.80E+00
Hexachlorobutadiene	1.09E-03	7.34E+01	1.53E-01	5.75E+01

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Table 6 - Programmatic Preliminary Risk-Based Remediation Goals For RFETS

Target Analyte List Chemical	Residential Groundwater (mg/L or pCi/L)	Office Worker Soil (mg/kg or pCi/g)	Open Space Surface Water (mg/L or pCi/L)	Open Space Soil (mg/kg or pCi/g)
Hexachlorocyclopentadiene	2.56E-01	1.37E+04	3.58E+01	1.33E+04
Hexachloroethane	6.08E-03	4.09E+02	8.52E-01	3.20E+02
2-Hexanone (V)	-	-	-	-
Indeno(1,2,3-cd)pyrene	1.17E-04	7.84E+00	1.63E-02	6.14E+00
Iron	1.10E+01	6.13E+05	1.53E+03	5.76E+05
Isophorone	8.96E-02	6.02E+03	1.26E+01	4.72E+03
Lead	-	1.00E+03 [a]	-	-
Lithium	7.30E-01	4.09E+04	1.02E+02	3.84E+04
Magnesium	-	-	-	-
Manganese	1.72E+00	6.68E+04	2.40E+02	8.36E+04
Mercury	1.10E-02	6.13E+02	1.53E+00	5.76E+02
Methoxychlor	1.83E-01	1.02E+04	2.56E+01	9.61E+03
Methylene chloride (V)	1.14E-02	7.63E+02	1.59E+00	5.98E+02
2-Methylnaphthalene (V)	1.46E+00	8.18E+04	2.04E+02	7.68E+04
4-Methyl-2-pentanone (V)	2.92E+00	1.64E+05	4.09E+02	1.54E+05
2-Methylphenol	1.83E+00	1.02E+05	2.56E+02	9.61E+04
4-Methylphenol	1.83E-01	1.02E+04	2.56E+01	9.61E+03
Molybdenum	1.83E-01	1.02E+04	2.56E+01	9.61E+03
Naphthalene (V)	1.46E+00	8.18E+04	2.04E+02	7.68E+04
Nickel	7.30E-01	4.09E+04	1.02E+02	3.84E+04
2-Nitroaniline	2.19E-03	1.23E+02	3.07E-01	1.15E+02
3-Nitroaniline	-	-	-	-
4-Nitroaniline	-	-	-	-
Nitrobenzene (V)	1.83E-02	1.02E+03	2.56E+00	9.61E+02
2-Nitrophenol	-	-	-	-
4-Nitrophenol (V)	2.92E-01	1.64E+04	4.09E+01	1.54E+04
n-Nitrosodiphenylamine (V)	1.74E-02	1.17E+03	2.43E+00	9.15E+02
n-Nitrosodipropylamine (V)	1.22E-05	8.18E-01	1.70E-03	6.40E-01
Pentachlorophenol	7.10E-04	4.77E+01	9.94E-02	3.74E+01
Phenanthrene (V)	-	-	-	-
Phenol	2.19E+01	>1E+06	3.07E+03	>1E+06
Potassium	-	-	-	-
Pyrene	1.10E+00	6.13E+04	1.53E+02	5.76E+04
Selenium	1.83E-01	1.02E+04	2.56E+01	9.61E+03
Silver	1.83E-01	1.02E+04	2.56E+01	9.61E+03

Table 6 - Programmatic Preliminary Risk-Based Remediation Goals For RFETS

Target Analyte List Chemical	Residential Groundwater (mg/L or pCi/L)	Office Worker Soil (mg/kg or pCi/g)	Open Space Surface Water (mg/L or pCi/L)	Open Space Soil (mg/kg or pCi/g)
Sodium	-	-	-	-
Strontium	2.19E+01	>1E+06	3.07E+03	>1E+06
Stryene (V)	7.30E+00	4.09E+05	1.02E+03	3.84E+05
1,1,2,2-Tetrachloroethane (V)	4.26E-04	2.86E+01	5.96E-02	2.24E+01
Tetrachloroethene (V)	1.64E-03	1.10E+02	2.29E-01	8.62E+01
Thallium	-	-	-	-
Tin	2.19E+01	>1E+06	3.07E+03	>1E+06
Toluene (V)	7.30E+00	4.09E+05	1.02E+03	3.84E+05
Toxaphene	7.74E-05	5.20E+00	1.08E-02	4.07E+00
1,2,4-Trichlorobenzene (V)	3.65E-01	2.04E+04	5.11E+01	1.92E+04
1,1,1-Trichloroethane (V)	7.30E-01	4.09E+04	1.02E+02	3.84E+04
1,1,2-Trichloroethane (V)	1.49E-03	1.00E+02	2.09E-01	7.86E+01
Trichloroethene (V)	7.74E-03	5.20E+02	1.08E+00	4.07E+02
2,4,5-Trichlorophenol	3.65E+00	2.04E+05	5.11E+02	1.92E+05
2,4,6-Trichlorophenol	7.74E-03	5.20E+02	1.08E+00	4.07E+02
Vanadium	2.56E-01	1.43E+04	3.58E+01	1.34E+04
Vinyl acetate	3.65E+01	>1E+06	5.11E+03	>1E+06
Vinyl chloride (V)	4.48E-05	3.01E+00	6.28E-03	2.36E+00
Xylene (total) (V)	7.30E+01	>1E+06	1.02E+04	>1E+06
Zinc	1.10E+01	6.13E+05	1.53E+03	5.76E+05
Nitrate	5.84E+01	>1E+06	8.18E+03	>1E+06
Nitrite	3.65E+00	2.04E+05	5.11E+02	1.92E+05
Sulfide	-	-	-	-
Ammonium (as Ammonia)	3.54E+01	>1E+06	4.96E+03	>1E+06
Bicarbonate	-	-	-	-
Bromide	-	-	-	-
Carbonate	-	-	-	-
Chloride	-	-	-	-
Fluoride (as fluorine)	2.19E+00	1.23E+05	3.07E+02	1.15E+05
Orthophosphate	-	-	-	-
Silica (as Si and SiO2)	-	-	-	-
Sulfate	-	-	-	-

Table 6 - Programmatic Preliminary Risk-Based Remediation Goals For RFETS

Target Analyte List Chemical	Residential Groundwater (mg/L or pCi/L)	Office Worker Soil (mg/kg or pCi/g)	Open Space Surface Water (mg/L or pCi/L)	Open Space Soil (mg/kg or pCi/g)
Am-241	1.45E-01	8.00E+00	2.03E+01	1.58E+01
Cs-137+D	1.51E+00	1.05E-01	2.11E+02	5.57E-01
Pu-239	1.51E-01	1.00E+01	2.11E+01	1.75E+01
Pu-240	1.51E-01	1.00E+01	2.12E+01	1.75E+01
Ra-226+D	1.61E-01	3.24E-02	2.25E+01	1.72E-01
Ra-228+D	1.92E-01	6.64E-02	2.69E+01	3.51E-01
Sr-89	4.62E+00	1.76E+02	6.47E+02	4.32E+02
Sr-90+D	8.52E-01	5.72E+01	1.19E+02	9.94E+01
Tritium	6.66E+02	4.47E+04	9.32E+04	7.77E+04
U-233	1.06E+00	6.78E+01	1.49E+02	1.22E+02
U-234	1.07E+00	6.87E+01	1.50E+02	1.23E+02
U-235+D	1.01E+00	8.16E-01	1.42E+02	4.25E+00
U-238+D	7.68E-01	3.85E+00	1.08E+02	1.78E+01

Notes:

(V) = Chemicals listed are volatile.

- = No toxicity value available.

NA = PPRG value is not applicable for this exposure scenario. Dual oral RfDs available for cadmium. The first value (5E-04) is representative of pathways involving water and the second value (1E-03) is representative of pathways involving food (soil).

[a] U.S. Environmental Protection Agency (EPA). 1994. Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities.

Office of Solid Waste and Emergency Response, Washington, D.C. Directive 9355.4-12.

Appendix Q
DATA MANGEMENT

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APPENDIX Q

1.0 DATA MANAGEMENT

A variety of data will be generated during accelerated actions or decommissioning. These data include, but are not limited to:

- Air monitoring data
- Meteorological data
- Ecological data
- Surface water monitoring data (including physical and chemical information)
- Groundwater monitoring data (including analytical and field parameters)
- Well construction data
- Geological information
- Spatial data
- Soils data (analytical and physical data)
- Other characterization data (including HPGe field data)

The specific types of monitoring and the types of data collected are evaluated during project scoping and identified in the required project planning documents. The data collected during closure activities are essential to the successful closure of the RFETS and, therefore, proper data management is a key responsibility of the project.

1.1 Environmental Data Quality

In most instances, analytical data collected in support of a SAP should be evaluated using the guidance described in the Rocky Flats Administrative Procedure 2-G32-ER-ADM-8.02, *Evaluation of ERM Data for Usability in Final Reports*. This procedure establishes the guidelines for evaluating analytical data with respect to the PARCC parameters. A definition of PARCC parameters and the specific applications to the investigation are as follows:

Precision A quantitative measure of data quality that refers to the reproducibility or degree of agreement among replicate or duplicate measurements of a parameter. The closer the numerical values of the measurements are to each other, the lower the relative percent difference and the greater the precision. The relative percent differences (RPD) for results of duplicate and replicate samples will be tabulated according to matrix and analytical suites to

compare for compliance with established precision DQOs. Deficiencies will be noted and qualified, if required.

Accuracy A quantitative measure of data quality that refers to the degree of difference between measured or calculated values and the true value of a parameter. The closer the measurement to the true value, the more accurate the measurement. The actual analytical method and detection limits will be compared with the required analytical method and detection limits for VOCs and radionuclides to assess the DQO compliance for accuracy.

Representativeness A quantitative characteristic of data quality defined by the degree to which the data absolutely and exactly represented the characteristics of a population. Representativeness is accomplished by obtaining an adequate number of samples from appropriate spatial locations within the medium of interest. The actual sample types and quantities will be compared with those stated in the SAP or other related documents and organized by media type and analytical suite. Deviation from the required and actual parameters will be justified, as required.

Completeness A quantitative measure of data quality expressed as the percentage of valid or acceptable data obtained from a measurement system. A completeness goal of 90% has been set for SAPs. Real samples and QC samples will be reviewed for the data usability and achievement of internal DQO usability goals. If sample data cannot be used, the non-compliance will be justified, as required.

Comparability A qualitative measure defined by the confidence with which one data set can be compared to another. Comparability will be attained through consistent use of industry standards (e.g., SW-846) and standard operating procedures, both in the field and in laboratories. Statistical tests may be used for quantitative comparison between sample sets (populations). Deficiencies will be qualified, as required. Quantitative values for PARCC parameters for the project are provide in Table Q-1.

Laboratory validation should be performed on 25% of the characterization data colleted. Laboratory verification shall be performed on the remaining 75% of the data. Data usability shall be performed on laboratory validated data according to procedure 2-G32-ER-ADM-08.02, *Evaluation of ERM Data for Usability in Final Reports*.

Table Q-1 PARCC Parameter Summary

PARCC	Radionuclides	Non-Radionuclides
Precision	Duplicate Error Ratio ≤ 1.42	
Accuracy	Detection Limits per method and ASD Laboratory SOW	Comparison of Laboratory Control Sample Results with Real Sample Results
Representativeness	Based on SOPs and SAP	Based on SOPs and SAP
Comparability	Based on SOPs and SAP	Based on SOPs and SAP
Completeness	90% Useable	90% Useable

Data validation will be performed according to ASD procedures, but will be done after the data is used for its intended purpose. Analytical laboratories supporting this task have all passed regular laboratories audits by ASD.

The ASD provides analytical laboratory validation/verification for all soil, water, and air data according to *General Guidelines for Data Verification and Validation (DA-GRO1-v1)*, December 3, 1997. ASD also provides results for a majority of analysis via an EDD, which includes information on the results of the data validation/verification process. The EDDs are designed for import into site environmental data systems to support further analysis and interpretation of the data.

Projects collecting and reporting non-laboratory data, such as field parameters, geologic logging, ecological sampling, etc, are required to follow and document adherence to site and program specific QA/QC procedures.

1.2 Environmental Data Systems

RFETS environmental data systems are a combination of individual systems developed by programs to support required environmental monitoring and reporting. Current environmental data systems are shown in Table Q-2.

Table Q-2 Current Data Systems at RFETS

Environmental Data System	Typical Data
Air Monitoring System Database	Effluent air, ambient air, meteorology
Soil Water Database	Soil, groundwater, surface water, HPGe, water levels, field parameters, flow
Ecology Database	Ecological species, soil types, sampling locations
Geographic Information System (GIS)	Spatial data
Analytical Services Toolkit/EDDPro	Laboratory analyses tracking, electronic laboratory analyses
WSRIC	Waste characterization
WEMS	Waste container tracking

Most environmental data systems have been upgraded in the last year and several are scheduled for upgrade during FY99. Additional upgrades that are anticipated include conversion to common site standard platforms and improved electronic transfer of data from the laboratory system to the individual environmental databases.

Projects that collect air, soil, ecology, and water data are required to direct electronic data to the applicable database. In this way, such data will be easily available for secondary uses, as well as available in the future, long after the original project is completed and closed out. This relieves the RFCA project manager from long-term data management requirements beyond Site-required record keeping requirements. All data entered into environmental data systems must have a location and sampling event identified.

The current configuration and platform of the SWD allows data other than just soil and groundwater to be stored (for example HPGe data have been recently included). RFCA project managers collecting waste characterization data or other types of D&D data should strongly consider storing their electronic data within SWD to ensure long term retrievability and consistent backup. Because all laboratory data are generated with an EDD and the platform and configuration of the SWD is not media specific, using SWD to store other types of data is highly cost effective and a long-term benefit to the Site closure.

1.3 Public Dissemination of Environmental Data

During FY99, the Site is required to meet RFCA Milestone M9 - "Complete information management system for integrated site-wide monitoring and environmental data by 9/30/99". This Milestone requires that data specified in the IMP be provided to regulators as requested. To support this data transfer effort, some computer system programming and program database interfaces will be developed and/or improved. This development effort (known as ISEDS or Integrated Site-wide Environmental Data Systems) will facilitate data transfer to

requesting external organizations from existing program databases. The effect on existing systems will likely be improved data transfer from the analytical services data system and possibly platform modifications to Site standards. ISEDS will not involve creation of a new data system, but rather, it will rely on improvements in data transfer among existing systems.

Meeting the milestone will also involve development and implementation of a world wide web (WWW) homepage to facilitate electronic transfer of environmental data reports to Stakeholders. The Environmental Data Dynamic Information Exchange (EDDIE) homepage will impact RFCA project managers in several ways:

- Reports submitted to regulators under the IMP will be posted on the WWW, and therefore be far more widely distributed. This could result in increased review, comment and discussion on reports and the costs associated with addressing additional issues
- All reports submitted under the IMP will be required to be produced in electronic format. Electronic copies of files must be sent to the ISEDS administrator for WWW posting. This requirement should not materially impact project budgets or schedules
- All IMP electronic data will be made available to the regulators (and possibly other stakeholders) for independent analysis. Validation and verification codes will be included in electronic files. It is therefore possible to have additional scrutiny by regulators on data analysis and subsequent closure decisions
- Reports will be easily available to Site staff and managers for their use

1.4 Additional Requirements for Soils, IDM and other Solids

1.4.1 Data transfer to SWD

To ensure the long term viability of electronic data for soils and other solids, project managers are obligated to formally transfer soil and solids data generated in conjunction with ER actions, decommissioning, and construction activities to the SWD. This includes all media, including verification soil sampling, investigation-derived materials (IDM) sampling, stockpiles, etc. Electronic data transfer is easy and convenient and can be automated by identifying the data in the analytical services toolkit (AST) system as "owner_id" = SWD. This will automatically place any electronic laboratory generated data into the site's soil database for future use.

1.4.2 Designation of No Longer Representative Samples

Project managers are required to generate the information necessary to flag old soils data that have been superseded during any RFCA action (i.e., the site has been remediated and soils have been treated and removed/replaced). The No Longer Representative flag in the SWD database will be essential to future decision making, especially during risk assessment activities.

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1.4.3 Verification Soil Sampling

Any verification soil sampling collected to demonstrate the satisfaction of performance objectives must be formally transferred to SWD. Adequate information must be provided with the data to ensure that the proper location of the sample is recorded.

1.4.4 Stockpile Sampling

Where treated or untreated soil has been stockpiled and sampled prior to returning the soil to an excavated location (putback), any sample results representative of the stockpile and thus representative of the returned soils, must be placed in the SWD database.

Similarly, where treated or untreated soil has been stockpiled and sampled prior to management in a location different from the excavated location, any sample results representative of the stockpile, and thus representative of the soil at the new location, must be included in SWD with the new location information.

APPENDIX 4

SUMMARY LEVEL BASELINE

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**FINAL RFCA
APPENDIX 4
UPDATE PAGES
FEBRUARY 26, 1999**

**ROCKY FLATS CLOSURE PROJECT
COMPLETION METRICS BASELINE**

AND

**ROCKY FLATS CLOSURE PROJECT
CRITICAL CLOSURE PATH CHART**

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7641-7642

Rocky Flats Closure Project Completion Metrics Baseline

Key Closure Activities	FY97	FY98 Plan	FY98 Actual	FY98 Mortgage	FY99	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	TOTAL
Site Shipments																	
Pla (percent of inventory)	0	0	0	38%	0%	0	0	0	0	0	0	0	0	0	0	0	100
cu (percent of inventory)	0	0	0	6%	78%	0	0	0	0	0	0	0	0	0	0	0	92%
Component Parts (percent of inventory)	0	0	0	0	0	45%	45%	10%	0	0	0	0	0	0	0	0	100%
Ship Pu Metals and Oxides (# of shipments)	0	0	0	0	0	700	1,100	500	0	0	0	0	0	0	0	0	2,300
Place Pu Metals and Oxides in 3013 (Qty. Containers)	0	0	0	0	0	750	1,000	150	0	0	0	0	0	0	0	0	1,900
Drum B371 Area	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	12
Drum & Removes B771 Liquid Systems	0	0	0	2	12	9	12	0	0	0	0	0	0	0	0	0	37
Residues (kg bulk)																	
Sol Category																	
Disposition Sol Residues	0	3,600	3,600	2,812	7,075	6,525	0	0	0	0	0	0	0	0	0	0	17,400
Air Category																	
Repackaging SS&C	0	2,700	2,700	2,601	600	0	0	0	0	0	0	0	0	0	0	0	3,300
Ship SS&C to SRS	0	600	600	600	1,300	2,000	0	0	0	0	0	0	0	0	0	0	3,900
Disposition Air Category Fines	0	1,000	1,000	1,000	7,950	9,800	5,400	0	0	0	0	0	0	0	0	0	24,150
Combustibles Category																	
Disposition Wet Combustibles	0	2,200	2,200	2,200	6,500	5,000	5,000	3,700	0	0	0	0	0	0	0	0	23,400
Ship Solids to SRS	0	0	0	0	0	317	0	0	0	0	0	0	0	0	0	0	317
Inorganic Category																	
Dry Residue	0	8,800	8,800	8,800	8,700	11,400	9,200	1,800	0	0	0	0	0	0	0	0	37,700
Ship Low-Level Mixed Waste for disposal (m³)	2,564	4,126	4,126	2,401	2,886	6,575	5,000	8,000	2,706	1,427	1,887	185	8,000	4,555	2,710	0	50,601
Ship Low-Level Waste for disposal (m³)	1,288	2,045	2,045	318	2,300	2,050	10,000	20,000	20,000	20,000	18,731	11,849	14,182	5,742	2,005	0	130,892
Ship TRU Waste for disposal (m³)	0	128	128	128	1,000	2,000	2,000	2,000	2,000	2,000	2,000	1,321	261	14	11	0	14,733
Non-Radioactive Waste Disposal/Recycling (m³)	347	87	87	210	88	186	84	77	399	137	271	358	121	71	317	0	2,544
Ship Sanitary Waste for disposal (m³)	9,873	9,481	9,481	8,783	19,800	18,400	28,200	18,800	31,600	30,100	28,900	38,400	37,800	2,500	19,000	0	288,634
Disposition Waste Chemicals (Containers)																	
Facility Groups Completed (Consent Order requirement)	2	10	10	3	9	0	0	0	0	0	0	0	0	0	0	0	18
Waste Chemical Program (Containers)	23,850	25,482	21,842	0	4,000	0	0	0	0	0	0	0	0	0	0	0	53,342
Leak Cycle Program (Containers)	0	5,000	4,891	0	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	1,000	500	58,500
Demolition Buildings & Facilities (at Rocky Flats)	19	8	12	8	9	33	20	18	14	28	107	55	143	191	75	0	718
Major Buildings																	
(Include B&V)	53,028	23,338	26,178	2,840	8,462	91,051	198,461	108,888	249,114	208,624	397,204	855,107	689,438	588,955	224,348	0	3,495,998
Demolition Environmental Sites (#)	1	1	1	1	4	1	2	2	3	4	8	20	11	8	2	0	85
Disposition of Property (#)	30,000	30,000	33,000	3,000	80,000	79,850	85,247	78,130	36,060	72,120	78,130	30,050	25,900	0	0	0	811,487
Disposition Classified Matter (#)	2,850,400	82,000	148,105	58,105	13,300	12,500	11,700	10,900	9,900	8,300	7,500	8,700	0	0	0	0	3,023,200

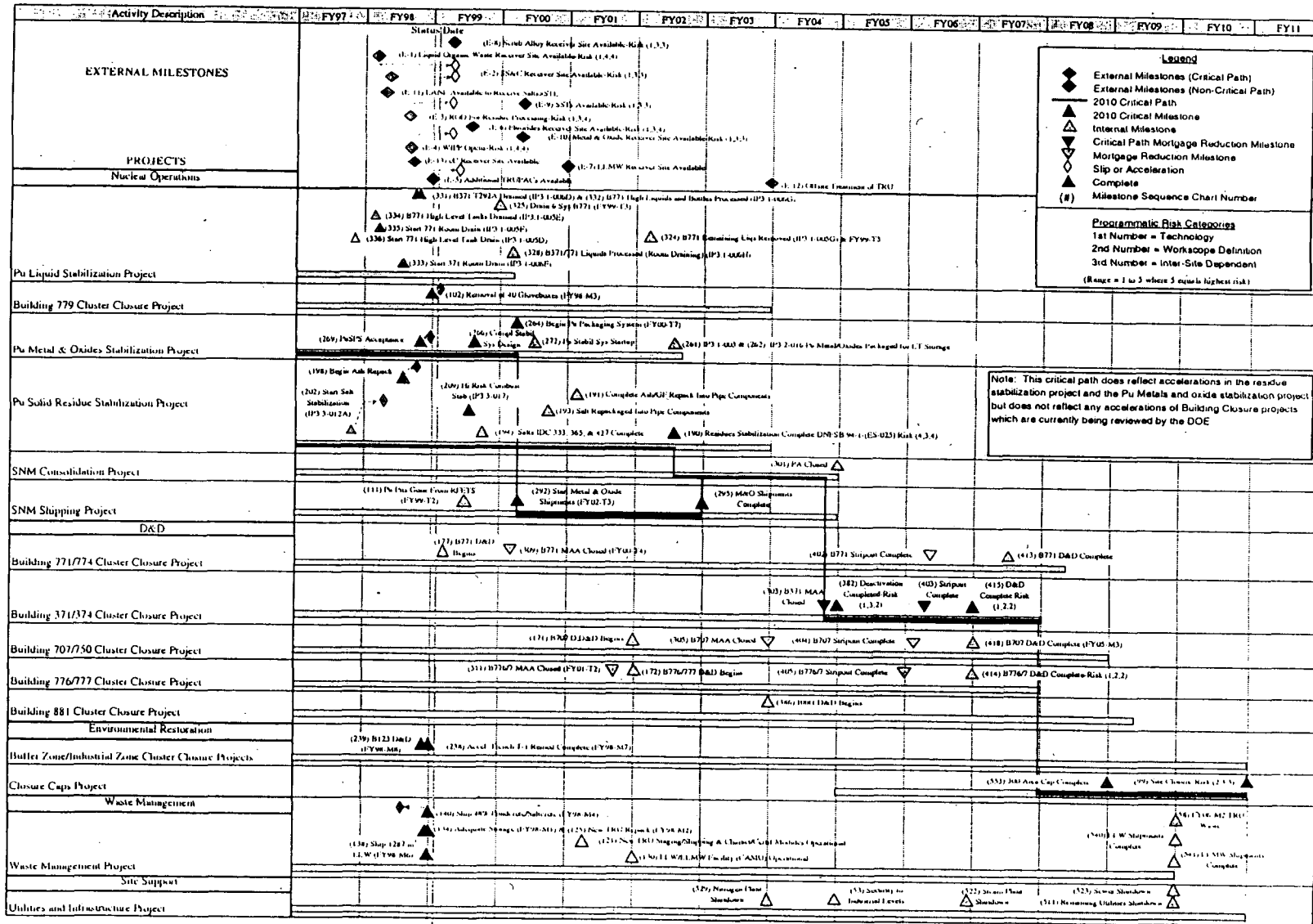
Note 1: A negative FY98 mortgage means more work in a specific area was accomplished versus plan. A positive mortgage indicates less work was accomplished versus plan.

Updated: 12/12/99

Note 2: In some cases actual quantities regarding disposition were less than planned, meaning all required work was completed and there was no carryover mortgage.

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Rocky Flats Critical Closure Path Chart Closure Project Baseline



APPENDIX 5

WATER MANAGEMENT

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WATER MANAGEMENT

A Surface Water and Groundwater Working Group (Group) has been created. The Group is composed of representatives of the U.S. Department of Energy, the U.S. Environmental Protection Agency, the Colorado Department of Public Health and Environment, Kaiser-Hill, Inc., the U.S. Fish and Wildlife Service and the cities of Westminster, Northglenn, Thornton, Broomfield, Boulder, Arvada, and Jefferson and Boulder Counties. Any other entity that anticipates downstream water quality obligations from the Rocky Flats site will be invited to join the Group.

The Group will develop and recommend to the decision-makers an Integrated Water Management Plan (IWMP). The Group will be guided by relevant agreements, statutes and regulations such as provisions in the Rocky Flats Cleanup Agreement (RFCA) and its Vision preamble. In addition, the Group will integrate numerous water quality documents currently under development including but not limited to the Integrated Monitoring Plan, the Pond Operation Plan, and if appropriate, revisions to existing water standards.

The Group will strive for consensus recommendations to the decision-makers regarding any decisions and actions related to water quality at, or impacted by, the Rocky Flats Environmental Technology Site.

The Group has completed a draft IWMP, which is currently distributed for review. By September 1996, a final IWMP will be completed by the Group and submitted to the Parties. The decision-makers will evaluate the Group's recommendations and IWMP and make a final decision on them. In its deliberations, the decision-makers will consult with the Group on any changes the decision-makers deem necessary on the Group's recommendations and IWMP before a final decision is made.

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"Final Rocky Flats Cleanup Agreement"

APPENDIX 6

TARGET ACTIVITIES FOR SPECIAL NUCLEAR MATERIAL MANAGEMENT AT RFETS

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RFCA Target Activities

FY99

- T1 Thermally stabilize 90% of the plutonium oxide generated during the year by 9/30/99.
- T2 Complete the off-site shipment of the pits by 9/30/99.
- T3 Drain 6 systems in Building 771 by 9/30/99.
- T5 Remove solid Cat I and II SNM (not holdup and composites) from Building 776/777 by 9/30/99.

FY00

- T1 Complete eU shipments.
- T2 Complete shipments of SS&C.
- T3 Complete SNM holdup removal in Building 771.
- T4 Close the Material Access Area in Building 771.
- T5 Drain mixed residue tanks to RCRA stable and remove Raschig rings in B776/777.

FY01

- T1 Complete holdup removal of areas above Safeguard Termination Limits (attractiveness Level D) in B776/777. (Does not include ducts or ventilation.)
- T2 Close the Material Access Area in B776/777.
- T3 Complete off-site shipment of fluorides.

FY02

- T1 Repackage Pu inorganic oxide and wet combustibles residues.
- T2 Complete salt stabilization.
- T3 Start off-site shipment of metal and oxide.

APPENDIX 7

ACRONYM LIST

Acronym List

AEA	Atomic Energy Act
AEC	Atomic Energy Commission
APCD	Air Pollution Control Division (in CDPHE)
ARAR	Applicable or Relevant and Appropriate Requirement
CAMU	Corrective Action Management Unit
CAPPCA	Colorado Air Pollution Prevention and Control Act
CCR	Colorado Code of Regulations
CDPHE	Colorado Department of Public Health and Environment
CDNR	Colorado Department of Natural Resources
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act (Superfund)
CERFA	Community Environmental Response Facilitation Act
CFR	Code of Federal Regulations
CHWA	Colorado Hazardous Waste Act
CMS	Corrective Measures Study
CRP	Community Relations Plan
DNFSB	Defense Nuclear Facilities Safety Board
DOE	(U.S.) Department of Energy
DOI	(U.S.) Department of Interior
DOJ	(U.S.) Department of Justice
DRC	Dispute Resolution Committee
EM	Environmental Management (an office within DOE)
EPA	Environmental Protection Agency
ER	Environmental Restoration
FFC	Federal Facility Compliance (Act)
FR	Federal Register
FS	Feasibility Study
HRR	Historical Release Report
HSWA	Hazardous and Solid Waste Amendments of 1984
LAG	The 1991 Interagency Agreement between DOE, EPA and CDPHE
IGD	Implementation Guidance Document
IHSS	Individual Hazardous Substance Site
IM	Interim Measure
FSUWG	Future Site Use Working Group
FY	(federal) Fiscal year
LRA	Lead Regulatory Agency
MOU	Memorandum of Understanding
NA/NFA	No Action/No Further Action
nCi	nanoCurie

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NCP	National Contingency Plan
NPL	National Priorities List
OMB	Office of Management and Budget
OSWER	Office of Solid Waste and Emergency Response (in EPA)
OU	Operable Unit
PAM	Proposed Action Memorandum
PCB	polychlorinated biphenyl
RCRA	Resource Conservation and Recovery Act
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
RFFO	Rocky Flats Field Office
RFI	RCRA Facility Investigation
RI	Remedial Investigation
SARA	Superfund Amendments and Reauthorization Act of 1986
SEC	Senior Executive Committee
SEDCR	State-EPA Dispute Resolution Committee
SESEC	State-EPA Senior Executive Committee
SNM	special nuclear materials
SRA	Support Regulatory Agency
TRU	transuranic
TSD	treatment, storage or disposal unit
UST	underground storage tank
WIPP	Waste Isolation Pilot Project

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APPENDIX 8

LETTER

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March 1, 1996

Mr. Mark Silverman
U. S. Department of Energy
Rocky Flats Office, Bldg 116
P.O. Box 928
Golden, Colorado 80402-0928

Dear Mr. Silverman,

In the course of RFCA negotiations, DOE indicated an interest in obtaining some assurance from the state that a proposal to co-locate facilities for the retrievable monitored storage (RMS) or disposal of hazardous or mixed remediation and process wastes would be acceptable to the regulators. Co-location is of concern to DOE because it may impact the orderly progress of cleanup and building decommissioning. CDPHE supports the notion of centralizing any long-term waste management units, such as RMSs and disposal units, so we support, as a conceptual matter, co-locating such facilities for remediation and process wastes. Of course, co-location must be consistent with technical and regulatory requirements.

For remediation wastes, the Parties have discussed at some length the use of a corrective action management unit (CAMU). As you know, the CAMU allows storage or disposal of remediation wastes without triggering certain RCRA requirements, such as the requirement to treat wastes to meet the land disposal restriction (LDR) treatment standards promulgated at 6 CCR 1007-3, Part 268. However, a CAMU cannot be used to manage hazardous or mixed process wastes. The draft Rocky Flats Cleanup Agreement (RFCA) embodies the Parties' agreement regarding designation of a CAMU for remediation wastes, and co-location of such a facility with a RCRA/CHWA Subtitle C facility for storage or disposal of hazardous or mixed process wastes at paragraph 79 (Rev. 12). The draft RFCA also specifies that wastes generated from activities regulated under RFCA -- environmental cleanup and building decommissioning -- are remediation wastes. We have concluded that pondcrete and other hazardous or mixed process wastes now stored at RFETS are not remediation wastes.

DOE has also expressed interest in an RMS for hazardous or mixed process wastes. Assuming use of a Subpart X unit (6 CCR 1007-3, § 264.600) as the regulatory mechanism for approving and permitting such an RMS, design criteria must ensure retrievability of wastes and protection of human health and the environment through a combination of requirements that include, but are not limited to: waste treatment as described in the following paragraph; detection and

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monitoring/inspection requirements; operating and design requirements, including cap/liner system that meets the requirements as set forth in 6 CCR § 1007-3, Part 264, Subpart N; a ground water monitoring system; and requirements for responding to releases of wastes or constituents from the units.

To ensure safe storage of hazardous or mixed process wastes in an RMS, treatment of wastes to meet the statutory LDR standard of "substantially diminish[ing] the toxicity of the waste or substantially reduc[ing] the likelihood of migration of hazardous constituents from the waste so that short-term and long-term threats to human health and the environment are minimized" (RCRA § 3004(m)) would be required prior to placement in the RMS. If the Subpart X RMS were ever converted to a disposal facility, the wastes in it would have to meet the statutory and regulatory LDR treatment standards in effect at the time of conversion from storage to disposal. In addition, a CHWA permit modification and a certificate of designation would have to be obtained.

We hope this letter has adequately addressed your questions. If you would like to discuss this matter further, please call me at 692-3356.

Sincerely,

/s/

Joe Schieffelin, Unit Leader
Permitting and Compliance Unit
Federal Facilities Program

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APPENDIX 9

THE ROCKY FLATS VISION

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THE ROCKY FLATS VISION

The vision for Rocky Flats is:

- To achieve accelerated cleanup and closure of Rocky Flats in a safe, environmentally protective manner and in compliance with applicable state and federal environmental laws;
- To ensure that Rocky Flats does not pose an unacceptable risk to the citizens of Colorado or to the site's workers from either contamination or an accident; and,
- To work toward the disposition of contamination, wastes, buildings, facilities and infrastructure from Rocky Flats consistent with community preferences and national goals.

GOALS IN SUPPORT OF THE ROCKY FLATS VISION

The following goals in support of the Vision will be accomplished in the shortest possible time, in the most cost effective manner, and within a streamlined, flexible and effective regulatory framework:

1. The highest priority at Rocky Flats is to reduce the risks posed by plutonium, other special nuclear materials, and transuranic wastes. These materials will be collected, consolidated and safely stored in a retrievable and monitored manner and in the fewest number of buildings for removal to off-site locations at the earliest possible date.
2. Other wastes presently stored on-site, generated during cleanup, and removed from buildings during cleanup and demolition will be collected, consolidated, treated where necessary, and placed in safe, monitored, and retrievable storage to await ultimate disposition. In some cases, on-site disposal may be appropriate for some waste types (but not transuranic wastes nor weapons useable fissile material) in light of being protective of health and the environment, safety, costs, and other feasibility considerations. Any on-site disposal decisions will be preceded by careful consideration of the pertinent factors and information, with input from local elected officials, local government managers, RFLII, CAB, other groups and citizens. In any case, the federal government will continue to be responsible for contamination or wastes left on-site.
3. The quality of water supplies of the communities surrounding Rocky Flats will be protected. In addition, the water leaving the site will be of acceptable quality for any use.
4. All buildings will be cleaned up as needed so that they can either be demolished or converted to other appropriate uses.
5. At a minimum, given current technology and resources, Rocky Flats will be cleaned up to allow open space uses in the Buffer Zone, restricted open space or industrial use for most

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of the existing Industrial Area, and other appropriate uses. Where possible, the site will be cleaned up to the maximum extent feasible. While many in the community expressed a desire for cleanup that would achieve average background levels, that is beyond the reach of today's technology, budgetary resources, and legal requirements. These limitations prevent the signatories from committing to such a goal. However, the cleanup will be conducted in a manner that will not preclude additional cleanup in the future. The site's unique ecological values will be preserved.

6. The need for public involvement in site activities is critical. Local elected officials, local government managers, RFLII, CAB, other groups and citizens have been and will continue to be consulted.

Signed this 19th day of July, 1996:

Roy Romer
Governor
State of Colorado

Gail Schoettler
Lt. Governor
State of Colorado

Alvin L. Alm
Assistant Secretary for Environmental
Management
U.S. Department of Energy

Jessie M. Roberson
Manager, Rocky Flats Field Office
U.S. Department of Energy

Fred Hansen
Deputy Administrator
U.S. Environmental Protection Agency

Jack McGraw
Acting Regional Administrator
Region 8
U.S. Environmental Protection Agency

Patti Shwayder
Executive Director
Colorado Department of Public Health
and Environment

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APPENDIX 10

DISCUSSION AND ANALYSIS OF THE ROCKY FLATS VISION

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DISCUSSION AND ANALYSIS OF THE ROCKY FLATS VISION

As a former contributor to our nation's defense, Rocky Flats is one of the larger U.S. Department of Energy nuclear industrial facilities undergoing cleanup and closure. Constructed in 1952 along what was then a sparsely populated area of the foothills near Denver, Rocky Flats now sits on the edge of a major metropolitan area. Over 2 million people live within 50 miles of the facility. The site is directly upstream of water supplies that serve four municipalities and over 300,000 people. As a result, a coherent course of action is needed to promote accelerated cleanup, consolidation, reuse and closure of the site.

The vision provides a broad statement for the future of Rocky Flats. All activities, agreements, planning documents and other legal arrangements shall be guided by the vision and preserve, to the maximum extent possible, the full range of options and opportunities necessary to help accomplish and attain the vision. Specific and day-to-day activities at the site will be governed by relevant agreements and other legal arrangements. The vision also will accommodate changing priorities, activities and strategies to reflect community values.

Below is a further elaboration of the vision and a discussion of its adaptability to meet future budgetary, technological, safety concerns and community preferences. Local elected officials, local government managers, RFLII, CAB, other groups and citizens will be fully involved in making decisions and addressing issues in all of the topics that follow.

1. Removal of Plutonium, Transuranic Wastes and Other Special Nuclear Material

The highest priority of the vision is to make Rocky Flats safe. This principally involves the collection, stabilization, and safe, secure and retrievable and monitored storage of plutonium, transuranic wastes and other special nuclear materials for as long as they remain at Rocky Flats. Presently, there is no off-site facility available to receive these materials from Rocky Flats. As a result, this material may remain at the site in a safe configuration for years. However, the agencies are committed to help secure the availability of off-site locations to receive these materials. These materials must be removed from Rocky Flats as soon as a location is found to receive them and it is safe to do so. The U.S. Department of Energy is committed to begin removing the plutonium and special nuclear materials that are weapons useable fissile materials as soon as possible with a target set to begin removal no later than the year 2010 with final removal completed by the year 2015. In the year 2000, these dates will be evaluated to determine if these time frames need to be adjusted and then established as enforceable commitments from that date forward. The Waste Isolation Pilot Plant (WIPP) in New Mexico may be available sooner than the year 2010 to receive transuranic wastes. The U.S. Department of Energy is committed to begin removing transuranic wastes to WIPP

or, if necessary, to another off-site location, as soon as it is available.

2. On-Site Disposal of Wastes and Materials

Efforts will be made to remove wastes, building debris and other materials from Rocky Flats to off-site disposal locations. However, budgetary, technological, safety and other considerations may require that some of these wastes be disposed of in-place or stored on-site in a safe and retrievable and monitored manner for many years. At some point in the future, it may be necessary after consultation with local elected officials, local government managers, RFLII, CAB, other groups and citizens, from a risk reduction, budgetary, technological, safety and environmental standpoint, to dispose of some of these stored wastes and materials on-site. If so, every effort will be made to minimize the amount of material that must be disposed of on-site. Future retrieval of wastes disposed of onsite will not be precluded if and when technological development, budgetary availability, and location of an off-site disposal facility permits such activity. Should any wastes or contamination remain on-site, the federal government will be responsible for effective monitoring, maintenance of facilities, and maintenance of institutional controls adequate to prevent exposure from, and any release of, other chemical or radiological contamination.

3. Water

The water supplies of the communities downstream of Rocky Flats will be protected during cleanup and closure activities and for the long-term. Water planning and standard setting processes will be conducted with the active participation and involvement of local governmental authorities and the public. The U.S. Department of Energy will maintain any systems that are needed to protect water resources.

4. Buildings

The cleanup of buildings, the consolidation of wastes and materials within them and the safe demolition of buildings will occur to reduce risks and reduce site operating costs. All radioactive and hazardous wastes stored in buildings and much of the equipment and hardware within them - such as duct-work, piping and equipment, some of which may be contaminated with radioactive and hazardous components - will be removed or decontaminated before the buildings are reused or demolished. The contaminated equipment and hardware removed from the buildings will be stored in a retrievable and monitored manner. Some on-site disposal of this material, including building debris, may be necessary. Those buildings that may have value for other economic uses will be identified and the option of converting and transferring these buildings to other appropriate uses once cleanup

and closure work on those buildings has been completed will be preserved.

5. Level of Cleanup

While cleaning up the site to average background levels for the Front Range of Colorado is a desire of many in the community, it is beyond the reach of today's technology, budgetary resources, and legal requirements. As a result, the site will be cleaned up to allow open space and other appropriate uses given current technology and fiscal resources. Further cleanup efforts will be made where feasible as fiscal resources and cost effective technology allow. The U.S. Department of Energy is committed to assuring ongoing monitoring and maintenance of any wastes or contamination remaining on-site, the containment of contamination, and allowing for the further treatment of wastes as new and emerging cost effective technologies become available. In addition, Rocky Flats contains a unique ecological habitat that cannot be easily replaced. Its ecological values will be preserved and protected to the maximum extent possible during cleanup and closure activities.

6. Land Use

All land use decisions pertaining to Rocky Flats will be made with the active involvement of local governmental authorities and the public. This vision anticipates that Rocky Flats will be cleaned up so that it can be used as open space or converted to other appropriate uses consistent with community preferences, although opportunities for residential use will be restricted. There will be a need to restrict access to certain areas of the site while cleanup and closure activities are conducted and while plutonium, transuranic wastes, and special nuclear materials remain on-site. Access and use restrictions also may need to be applied where residual contamination may be present and constitute a risk to the public and for areas that house storage facilities or possible landfills. However, most of the land should be able to accommodate a wide range of appropriate future uses and economic opportunities.

7. Budget

All efforts will be made to secure the funds necessary to accomplish this vision within the shortest possible time. However, the limitations of the federal budget and the need to reduce the costs of cleanups at federal facilities are realities that will affect the scope and pace of work. When budget shortfalls occur, the site's activities may need to be adjusted and time frames may need to be extended. The agencies will involve local elected officials, local government managers, RFLII, CAB, other groups and citizens on needed revisions and alternatives to the site's activities due to budget shortfalls. However, no matter how the site's activities and time frames may need to be adjusted because of budget realities, adherence to

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the vision's goals of reducing risk, preserving future opportunities, and achieving cleanup will always be preserved.

8. Technological Development

Every effort will be made to develop and apply new and emerging cost effective technologies to address waste treatment, cleanup and closure needs at the site. However, recognizing the urgent need to reduce risks, promote safety and advance activities to accomplish the vision, treatment, cleanup and closure activities may need to be accomplished using the best technology presently available. The agencies are committed to investigating and applying new and emerging cost effective technologies to treat and further cleanup any wastes or contamination remaining on-site, including wastes in storage and possible disposal facilities. New and emerging cost effective technologies will be explored on an ongoing basis as long as waste or contamination remain at Rocky Flats. Activities to accomplish the vision should not wait for the development of new technologies. However, permanent and irretrievable cleanup decisions will be kept to a minimum to take advantage of possible new and emerging cost effective technologies.

9. Local Elected Official and Community Involvement--

Rocky Flats is located in Jefferson County and near several municipalities. It lies within 50 miles of a metropolitan area of over 2 million people. As a result, the need for public involvement in site activities is critical. Local elected officials, local government managers, RFLII, CAB, other groups and citizens have been and will continue to be consulted. In particular, they will be consulted about future decisions regarding land use, water quality, storage or disposal options, and other significant strategic decisions pertaining to decontamination and decommissioning, soils remediation and reuse of the facilities, public safety, and infrastructure. The local governments which surround or are near Rocky Flats have permanent stewardship responsibilities that will be affected by Rocky Flats. These responsibilities demand that local government officials help shape and influence cleanup and closure decisions. In addition, stakeholder organizations play a vital role in providing broad community input on site decisions. Local elected officials, local government managers, RFLII, CAB, other groups and citizens will be invited to fully comment and advise on the selection and direction of projects and activities, and they will be involved early in formulating policies and prioritization of activities for the site.

10. Ethical Considerations

Reducing risks, protecting the public and workers, accelerating cleanup and closure activities, and increasing cost effectiveness are inherent in the vision. In addition, the vision reflects a number of overarching ethical considerations. Ethical stewardship at Rocky Flats requires a mechanism for continual governance and responsibility. Decisions must include consideration for the welfare of future generations. This stewardship acknowledges the communities and governments' mutually reinforcing responsibilities regarding our nuclear

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legacy. To this end, a commitment to caretaking nuclear materials is made for the future that includes:

- fairness;
- openness;
- trust and trust worthiness;
- accessibility of information;
- seeking sufficient resources; and
- consideration of options to reduce any uneven impacts to communities.

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"Final Rocky Flats Cleanup Agreement"

Proposed Consolidated Operable Units

Conceptual Strategy Purposes
for Discussion Only

See paragraph 67 of RFCA

EXPLANATION

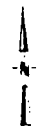
Note: OU3 not shown

- Industrial Area OU
- Buffer Zone OU
- Operable Unit 1
- Operable Unit 5
- Operable Unit 6
- Operable Unit 7
- Operable Unit 11 Closed through CAD/ROD Process
- Operable Unit 15 Closed through CAD/ROD Process
- Operable Unit 16 Closed through CAD/ROD Process
- Individual Hazardous Substance Sites (IHSS)

Standard Map Features

- Buildings or other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences
- Contours (20' intervals)
- Rocky Flats boundary
- Paved roads
- Dirt roads

DATA SOURCE:
Buildings, roads, and houses provided by
Fountain Eng.
EG&G Rocky Flats, Inc. - 1991.
Hydrology provided by
USGS - (data unknown)
Proposed Consolidated OU's data provided by
Aerospace Processes of RAMPSEA - 5-1992.



Scale = 1 : 10010
1 inch represents approximately 1000 feet

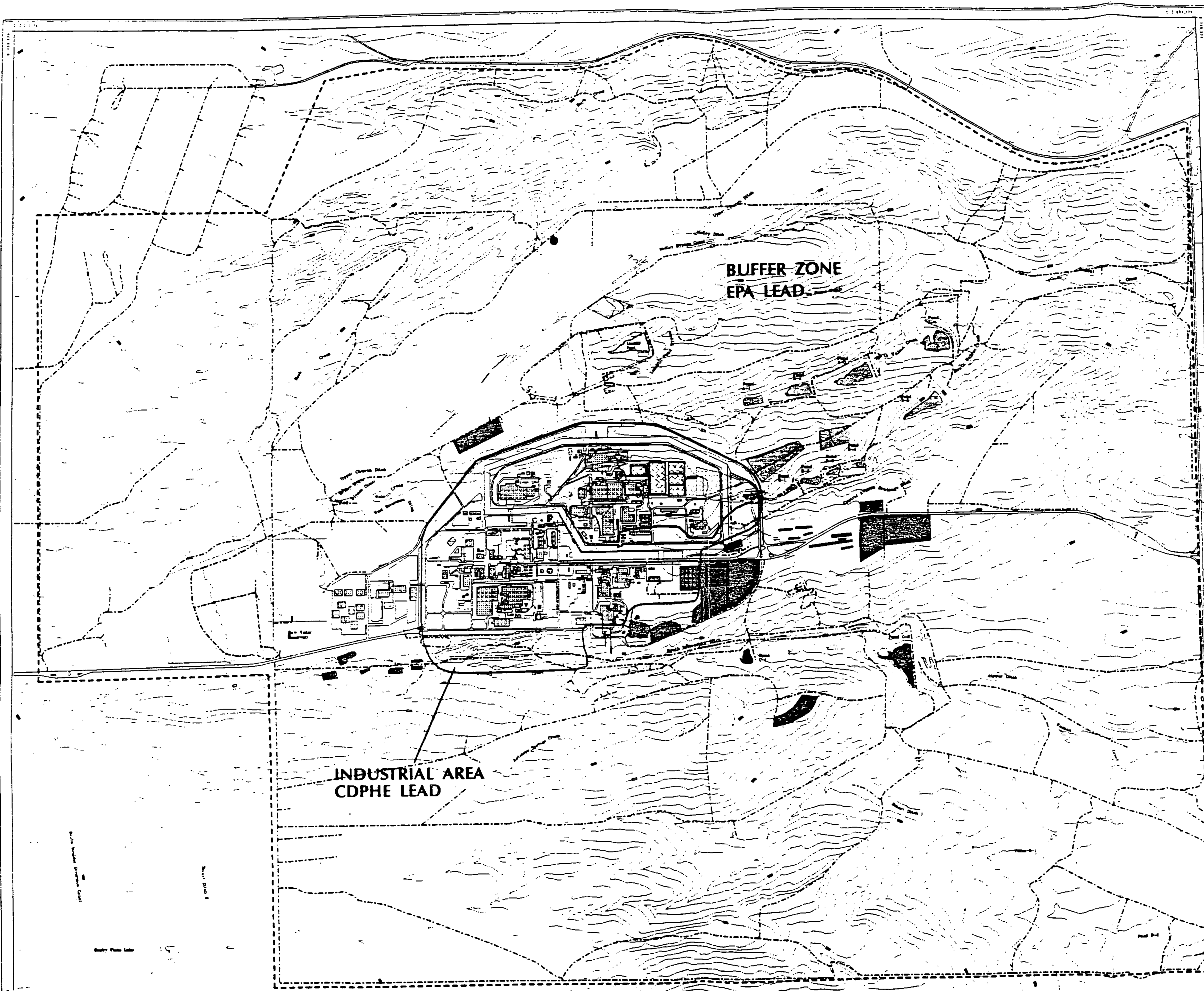


State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

MAP ID: 20002

July 11, 1992



92/724